

The Iron Age

A Review of the Hardware, Iron and Metal Trades.

Published every Thursday Morning by DAVID WILLIAMS, No. 83 Reade Street, New York. Entered at the Post Office, New York, as Second-Class Matter.

Vol. XXV: No. 4.

New York, Thursday, January 22, 1880.

\$4.50 a Year, Including Postage.
Single Copies, Ten Cents.

On Improvements in Machinery for Rolling Iron and Steel Plates.*

Before proceeding to describe the nature of the proposed improvements, it will be well to notice briefly the method generally adopted at present in rolling plates, as compared with that in use for producing flat bars, angles or other sections.

These latter forms of manufactured iron are produced by means of rolls with several grooves of gradually decreasing sectional area cut on their surfaces, so that generally two, and sometimes three, pairs of rolls are required to contain the number of grooves or spaces necessary. Thus the production of large sections of angle, tee, channel iron, &c., is very expensive on account of the first cost of the rolls, in cases where the section is an unusual one and the quantity of lengths required is not large. On the other hand, as the bar is rolled to its exact section and no allowance need be made in forming the pile for waste in shearing (except so much as is necessary to insure a clean end to the bar), the cost per ton rapidly diminishes with the increase in quantity produced.

Thus, of all forms of rolled iron, double-headed rails are the cheapest; then follow the commoner sections of angle iron, &c., used in shipbuilding, while the most expensive forms of all are the heavier sections of channel and joist iron, the cost of which is not only augmented by the ordinary difficulties attending their manufacture, but also, and perhaps to a still greater degree, by the smallness of the quantity required at one time.

With plates another state of things exists, and totally different conditions have to be taken into account in estimating the cost of any given specification. Here the cost of the rolls is not to be considered, nor is the quantity required at one time of much importance. The chief point affecting the cost of production (supposing the specification to require only plates of ordinary length, breadth and thickness) is the variable proportion of waste in rolling plates of different

rough 12-inch strip, is cut to waste on the edges alone. In other words, whereas a pile of 6 cwt. would be heavy enough to make a bar of a given weight 12 inches wide, a 9-cwt. pile would be required to produce a sheared plate of corresponding dimensions. This difference, of course, decreases as the width of the bar or plate increases, because the proportion which the allowance for waste bears to the whole mass becomes less and less the wider the plate. In all cases, however, to insure a sound section and no allowance need be made in forming the pile for waste in shearing (except so much as is necessary to insure a clean end to the bar), the cost per ton rapidly diminishes with the increase in quantity produced.

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vertical rolls move a little faster than those of the horizontal rolls. In practice it is not found desirable to compress the edge much more than is just about sufficient to preserve, without decreasing, the width, and the piles are generally made about the same width as the finished plate is intended to be. This implies the necessity for great diversity of width in the puddled bars, a difficulty which is usually got over in Belgium by using several narrow bars of variable width to form the tops and bottoms of the piles. Thus, from a stock composed of 5, 6, 7 and 8 inch puddled bars, piles of all widths above 10 inches could be built up,

haps, however, the most important point in its disfavor, especially for rolling steel, is the limit to the width of plate that can be produced by it. If the horizontal rolls are 6 feet 6 inches long, and the verticals 2 feet in diameter, 2 feet 6 inches would be the limiting width of plate for such a mill: since the vertical rolls when opened to such an extent come in contact with the standards. This was the limit at the Britannia Works; and plates were rolled there 32 feet long, by 2 feet 6 inches wide, $\frac{3}{4}$ inches thick, with perfectly sound and straight edges. No greater difficulty seems to attend the manufacture of wide than of narrow plates, ex-

sequently, rises or falls as the top roll is adjusted in height. By working the screw E a motion in the direction of its length is given to the top roll A, its necks being of such a form as to allow of this motion, while the bottom roll B remains firmly fixed between the standards. Attention to the drawing will show that end motion being given to the top roll A, it will carry with it the collar D, while collar C remains stationary, and by this means the distance apart of the two collars is adjusted *ad libitum*, being limited only by the travel allowed to the top roll A in the direction of its length. The illustrations show the form of box and spindle which has been adopted, and which has been found to present no inconvenience. The rolls are adjusted vertically in the usual way, but clearly they must not be allowed to open so far as to draw the collars out of the grooves. As this system of rolling is applicable to every stage of the process—forge rolling, blooming, roughing down and finishing—and to steel from the ingot as well as to iron from the pile, it will be necessary to describe it in connection with all these separately, as it will be found that there are certain points in each requiring special consideration.

Firstly, as to forge rolling. It is at all times inconvenient to use very wide piles, on account of their not heating uniformly, and of the space and height required in the furnace to allow of their being turned; hence, it will probably be found that rolls arranged for bars varying in width from 12 to 24 inches will meet all requirements. The collars and grooves would have to be of such a size as to allow of a vertical adjustment of about 5 inches. Such a mill would be an extremely simple affair, and need not be further described, but its use would be attended with great advantage in connection with all plate mills, whether the bars were to be afterward used in mills of the same construction or not. The same may be said as regards mills rolling large sections of bar iron, as the same pair of rolls would produce bars of any width, obviating the necessity for frequent change of rolls.

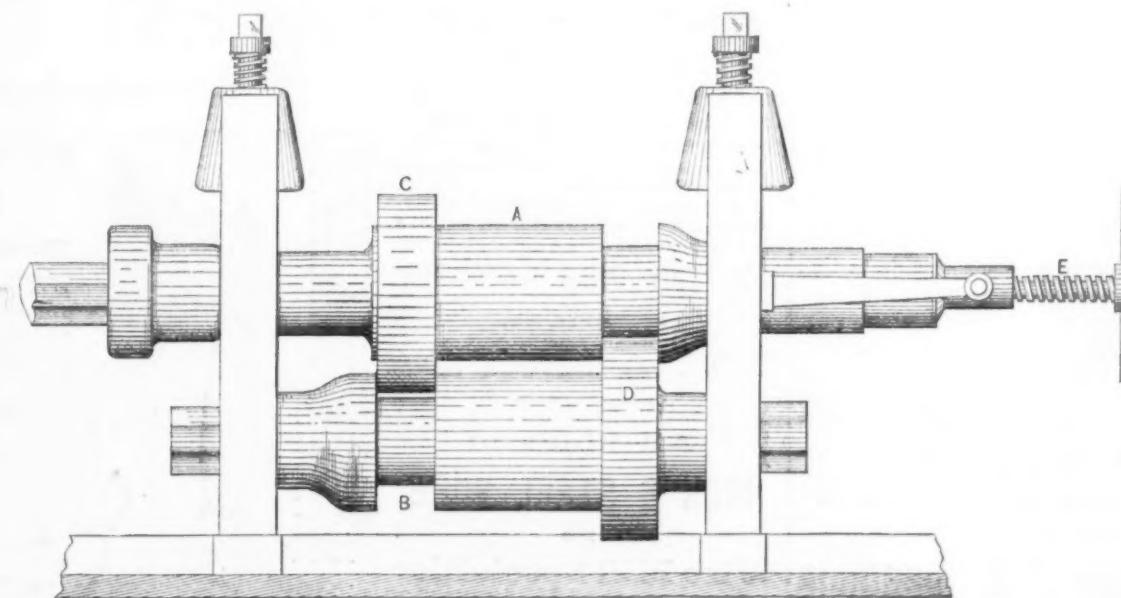


Fig. 1.—Elevation of Hutchinson's Rolling Mill.

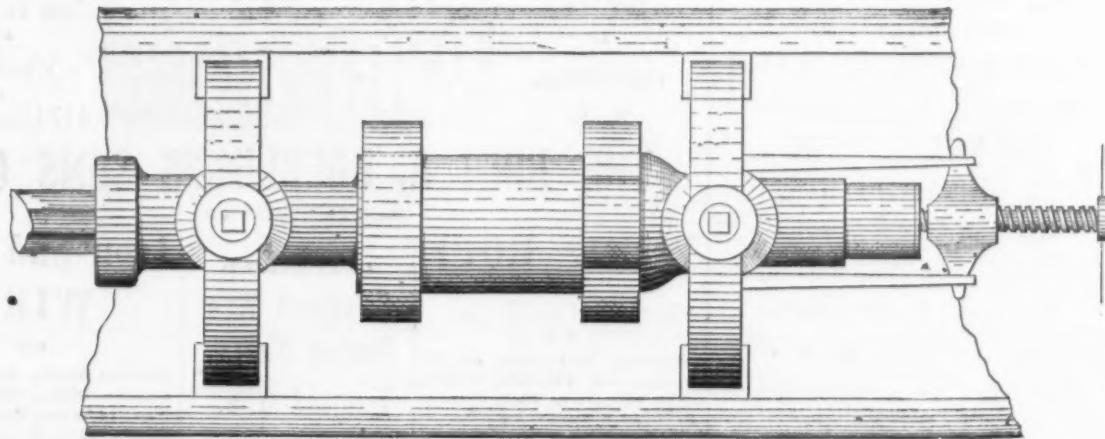


Fig. 2.—Plan of Hutchinson's Rolling Mill.

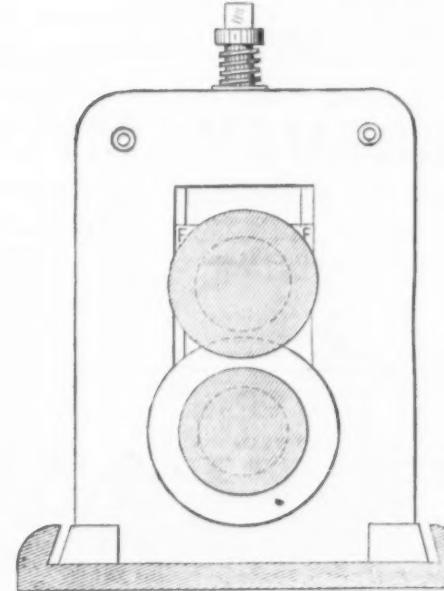


Fig. 3.—Vertical Section of Hutchinson's Rolling Mill.

HUTCHINSON'S IMPROVED MILL FOR ROLLING IRON AND STEEL PLATES.

widths and lengths, due to the fact that a certain width must be sheared off each side, as well as off the ends.

In the trade a bar is supposed to be 8 or 9 inches wide and under. All above this are taken as plates unless specially ordered as bars, most large bar mills now rolling bars up to about 12 inches wide if required. Bars above this latter width become very expensive, chiefly on account of the number of rolls which would be required for intermediate widths, &c., as well as the great number of sections of puddled bars which it would be necessary to provide. All above 12 inches wide and many under are, therefore, rolled as plates, and sheared on the sides as well as the ends. The process may be described as follows: A pile is made of puddled bar and of scrap, the latter composed of the shearing off finished plates. The puddled bars are generally from 12 to 18 inches wide, the width being regulated to some extent by that of the finished plate intended to be produced. After being heated, the rough pile is first put through blooming rolls, to close the edges and to compress and solidify the mass. It is then turned sideways to the rolls, and put through the roughing rolls as many times as are necessary to bring it to the required width, allowing a margin for shearing and for inaccuracies as to straightness, &c. It is then turned again and gradually elongated, partly in the roughing and partly in the finishing rolls, until brought down to the required gauge, regardless of its length. In order to insure a perfect plate, it is necessary to allow, say, at least 3 inches on each side in a strip of at least 12 inches, so that more than 30 per cent, in a

portion of plates which, owing to defective edges, will not cut to the size required. In the difference in value of the finished plate and that of the resulting scrap is, of course, greater than in iron, and the resulting loss is more serious in the same proportion.

In order to overcome these objections to the prevailing method of rolling plates, at least as regards narrow plates, the mill known as the "Universal Mill" was devised. It has also been called the Belgian mill, from its frequent adoption in Belgium. In this country it has not been generally successful, owing chiefly, it is believed, to the objection English workmen have to novel appliances, or, rather, perhaps to the difficulties which manufacturers in this country experience in adopting labor-saving machinery. The writer, however, has had an opportunity of judging of its merits during several months' fair work at the Britannia Works at Middlesborough-on-Tees. The construction of the Belgian mill is not, in a strict sense, of a complicated nature. When, however, we consider the great strength required for every part of this class of machinery, the rough usage, and the enormous cost of breakdowns and delay, we shall find that there are certainly more parts requiring careful adjustment about the Belgian mill than is consistent with the highest economy in production; in other words, if bars could be rolled in ordinary rolls of the same widths as in the Belgian mill, the latter could not compete with the former in point of economy. The Belgian mill is simply an ordinary mill with a pair of vertical rolls behind the horizontal ones. These catch the plate as it leaves the horizontal rolls, and compress the edge sufficiently to close and solidify it. The surfaces of the

rising by inches. It is, however, impossible to admit that a plate so made—i.e., with a welded instead of a solid surface—can be so sound or so uniform in tensile strength across the grain as one produced in the ordinary way. Most Belgian mills, probably with a view to avoid expensive complications, consist of only one pair of horizontal rolls working in combination with vertical rolls, and these are usually in connection with an ordinary plate mill. This prohibits a large production, as the rolls become too hot if the work is continuous.

The manipulation of the Belgian mill is by no means a simple matter, nor can it be placed in the hands of inexperienced or unskillful workmen. The slightest maladjustment of the screws, either of the vertical or horizontal rolls, will cause the plate to twist; while, if the vertical rolls are allowed to exert any undue pressure on the edge, it becomes thickened to such a degree that the plate is sure to curve more or less the next time it is passed through the rolls, and any attempt to straighten it afterward is generally useless. Under any circumstances the action of the vertical rolls is, to a certain degree, objectionable. The pressure, however slight, has a tendency to open the edge, and the thickening, which it is always difficult to avoid entirely, is for many purposes a serious drawback, as, for instance, where a number of plates of uniform width are placed a tendency to buckle when the plate is very wide and thin. This tendency to buckle, or bend up, between the vertical rolls would require, in plates above 2 feet wide, some special contrivance. This has not yet been worked out, and, although it is obvious that such an appliance could be devised, this complication would add very materially to the objections which already exist.

The advantages of the Belgian mill may thus be said to be confined to large establishments where more than one plate mill is in constant operation, and where a sufficient quantity of plates under about 2 feet 6 inches in width may always be selected from the orders in hand. Under such circumstances a very considerable saving may be effected. Whether or not it could be profitably applied to all classes of work is a problem which could be solved only at considerable expense.

The accompanying illustrations show the general construction of a sliding roll mill, designed to accomplish the same object as the Belgian mill, without being open to any of the more serious objections to the use of the latter. The construction of this mill may be thus described: The ordinary rolls of a plate mill are removed, and in the same standards a pair are substituted of the form shown on the drawing. It will be seen that the top roll A and the bottom roll B are nearly alike in form, and that a collar, C, is placed on the top roll A, and a collar D on the bottom roll B. These collars are not cast solid on the rolls, but are capable of sliding them, being held, however, in one position, as regards the other roll, by corresponding grooves. Applied to the end of the top roll A is a powerful screw, E, which takes its thrust from the top chock, and

Secondly, with regard to blooming. In some mills this operation could be advantageously combined with roughing down, and both operations done in the same rolls, the latter process being in fact but a continuation of the former. Where large plates were made, however, this would be found impracticable, as sufficient vertical adjustment in the top roll could not be obtained in one pair of rolls without cutting very deep grooves, and so leaving the roll dangerously weak. It is therefore necessary to have blooming rolls with a vertical adjustment in ordinary mills of about 5 inches; so that, taking a pile 12 inches deep, they would squeeze it down at once to 10 inches, and then by successive adjustments of the rolls to a minimum thickness of 7 inches, at which the roughing rolls are calculated to deal with it.

Thirdly, as to roughing down. This, as already stated, is simply a continuation of the blooming process. It must be remarked, however, that provision has only been made for puddled bars up to 2 feet wide, and perhaps even this is somewhat in excess of what could be used with due regard to economy of height and space in the heating furnace: hence all plates above this width would have to be rolled with their length in the direction of the width of the pile. There is no objection whatever to this, and it is frequently practiced for convenience sake in ordinary plate rolling. In these cases the length of the pile would correspond as nearly as may be with the width of the plate.

Fourthly, as to finishing rolls. These are made with still smaller collars than the roughing rolls, the adjustment necessary being extremely limited, say from 1 to $\frac{1}{4}$ inch; in other respects the rolls are of the same general form. It will be seen that it

*Read before the Institution of Mechanical Engineers by Mr. Edward Hutchinson, of Darlington, England.

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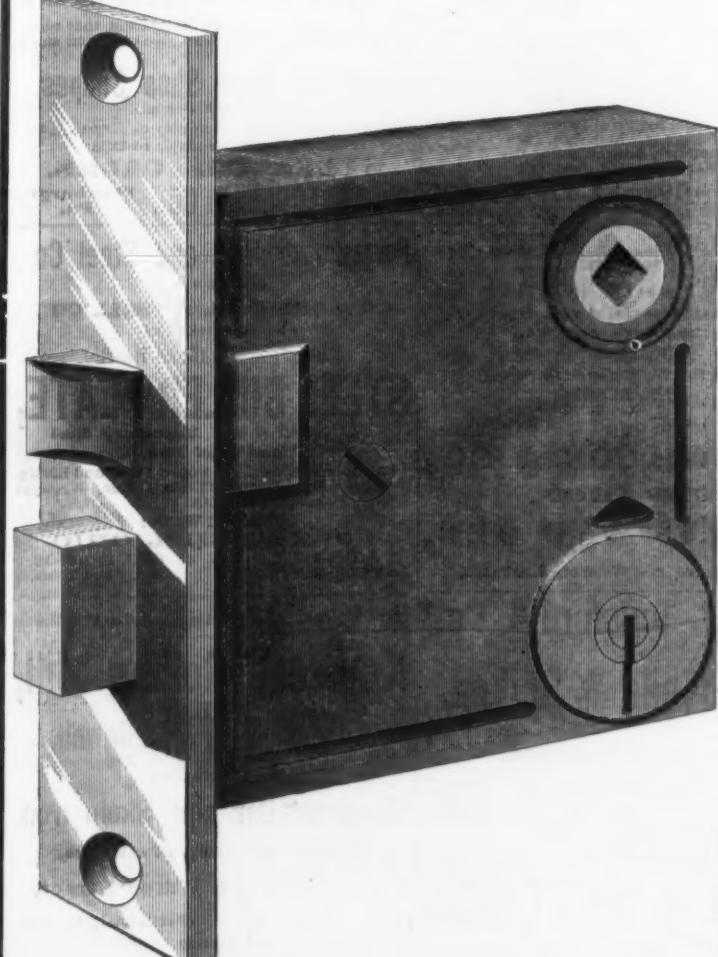
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is impracticable to provide for more than a limited length of travel for the top roll in any case, but more especially is this true of the finishing rolls, where the pressure in rolling is greatest; otherwise the rolls would become dangerously small in diameter in proportion to their length. In practice it will probably be found that a travel of about 2 feet will be as much as is convenient. So that beginning at 12 inches width, one pair of rolls would finish up to 3 feet and all intermediate widths. Another pair would begin at 3 feet, and with a travel of 2 feet would finish up to 5 feet, covering all intermediate widths. Where two mills were in constant operation the one could be kept on the narrower and the other on the wider plates; but where only one was in use the rolls would have to be changed occasionally, probably not more frequently than once a week.

The relative merits of this system of rolling as compared with those of the Belgian mill may be briefly noticed. It will be at once remarked that no real side compression can be given to the pile when rolled in this way. In practice, however, this cannot be effected even with the vertical rolls in the Belgian mill; nor is such compression necessary or desirable, as the pressure of the main rolls is quite sufficient to squeeze the piece laterally to such an extent as to make it fill the space between the collars in the one case, and between the vertical rolls in the other, and so form a close sound edge. But while in the Belgian mill the plate is subjected first to vertical pressure by the main rolls, and then to lateral pressure by the vertical rolls, in the sliding roll mill the pressures on sides and surface are simultaneous; and consequently no thickening of the edge or other similar imperfection is possible.

In the Belgian mill the pile must invariably be put into the rolls endwise, so that every pile must be made as wide as the plate to be rolled from it. This is a great difficulty when the plate is over 18 inches wide, and, so far as the writer is aware, has yet to be overcome. The collared roll is also much more readily adjusted to width than are the vertical rolls of the Belgian mill. In the latter case not only the rolls themselves, but also the guides, both before and behind the rolls, have to be adjusted with the greatest nicety. This causes considerable loss of time and waste of fuel and material, as after every readjustment one or two experimental plates have to be rolled to test its accuracy. The difference between the two mills in point of first cost need hardly be pointed out. The sliding roll mill does not greatly exceed, either in first cost or working expenses, a mill constructed on the present model; while a Belgian mill would cost about twice as much. Lastly, the rolling of steel plates by means of the machinery described will obviously present no difficulties. This point has already been alluded to; but inasmuch as rolling iron from a pile is much more complex operation than rolling steel from a solid ingot, the former process has received for the present the most attention, more perhaps than its declining importance deserves. Steel plates must sooner or later be used, to the very general exclusion of the inferior material; and it is confidently believed that the adoption of the process described would go far to lessen the great difference at present existing between the cost of making steel plates and that of making iron plates of an equal weight.

SCIENTIFIC AND TECHNICAL.

Mr. Eugene Vanderpool, in a paper read before the Society of Gas Lighting, gives the results of some experiments made by him and Dr. Schuessler to determine

THE CALORIFIC VALUE OF GAS.

He heated 2.75 lbs. of water from 68° F. to 150 degrees by 0.709 cubic feet of ordinary 16-candle coal gas, thus finding that one cubic foot will develop 318 heat units. A mixture of 6 per cent. of hydrogen and 35 per cent. of carbonic oxide was then tested, with a view to obtain approximately the calorific value of water gas, the composition of which approaches these figures. They found that it took 1.65 cubic feet of this gas to heat the same amount of water to the same temperature, showing that one cubic foot of the gas mixture developed 136.6 heat units, considerably less than illuminating gas.

According to Dingler's Poly. Journal, B. Lewison & Co., of Stuttgart, Germany, have invented a process for

PHOTOGRAPHING ON LEATHER,

or, at least, preparing leather for receiving photographic images. They first coat the material, black leather being the best, with a thin film of varnish, and then with a mixture of albumen and white lead. After drying, the photograph is made in the usual way.

Some time since news was received by cable from England to the effect that Mr. MacTear, a chemist at the St. Rollox Works, Glasgow, had discovered a process for

ARTIFICIAL DIAMONDS.

This statement was not supported by any particulars which might serve as a guide in determining the value of the process or the nature of the product obtained. Professor Maskeyne, a prominent chemist, now lays before the public the proofs that the crystals made are not diamond, but consist of a compound of silica, or possibly of more than one such compound. The materials submitted to him by Mr. MacTear were too small to see unless by very good eyesight or with a lens. They did not even scratch a polished surface of sapphire, and did not have the optical properties of the diamond. They did not burn before the blow-pipe. He found, however, that the supposed diamond particles would dissolve in hydrofluoric acid, and that the solution evaporated to dryness left behind a slight reddish-white incrustation.

Herr Carl Vogt, at a recent meeting of naturalists at St. Gallen, Switzerland, made some interesting observations in regard to

THE ARCHAEOPTERYX,

a fossil, the complete skeleton of which was recently discovered in the Solnhofen slates. The animal is half a reptile and half a bird, and is one of the strongest points of evidence in favor of Darwin's theory in regard to the

descent of birds from reptiles. When the first incomplete specimen, now in the British Museum, was discovered it was declared to be a bird because it possessed a bill, feathers and claws. The complete skeleton now found has shown that the animal has many of the characteristics of a reptile, having scales as well as feathers, a bill and teeth, claws on its wings and tail.

The desirability of avoiding the leakage of bottom seams in boilers has led to the introduction of sundry experiments to overcome the difficulty.

RECENT IMPROVEMENTS IN BOILER MAKING in England show a tendency toward the adoption of the system of welding the plates in complete rings, so as to avoid the necessity of having a rivet joint in the bottom of the boiler. This plan of construction is now in extensive use by a number of firms in England, and some little time ago the advisability of introducing the welding process into the engine department of the Palmer Shipbuilding and Iron Company (limited), Jarrow, was under the consideration of the managers of that firm; but while it was admitted that welding the plates into one ring provided the remedy desired, it was looked upon with suspicion alike by Lloyds' Association and the representatives of the Board of Trade, on the ground that the soundness of the work was dependent upon the individual skill of the workman employed in the operation of welding. Out of the consideration and thought devoted to this important subject, however, a new method to overcome the acknowledged difficulty was hit upon. The boiler plates are made sufficiently long enable a complete boiler ring to be formed of only two plates, instead of several short ones, as is the custom in the ordinary mode of construction. The first barrier, that of getting plates rolled up to the requisite dimensions, was speedily surmounted by Mr. Roberts, the manager of the Jarrow Rolling Mills, who, by means of new large rolls, was able to turn out boiler plates weighing, when finished, from 33 cwt. to over two tons. The second difficulty, however, was not so readily mastered. By the use of the ordinary horizontal "bending rolls" the work of bending the extra-sized plates into proper "set" was found to be an operation of very great difficulty, and entailing the expenditure of a large amount of additional time and labor. At length, however, Mr. William Gibb, the manager of the engine department, conceived the idea of using vertical "bending rolls" in lieu of the horizontal rolls. The idea was promptly developed, and a set of the new style of rolls has just been erected at Jarrow by Messrs. Scriven & Co., of Leeds Old Foundry, to whom the task of designing and making the new plant was intrusted by Mr. John Price, the general manager of Messrs. Palmer's. The new rolls are of exceedingly simple arrangement, and are eminently successful, for by their use there is a large saving of the labor and time consumed in the ordinary course of plate bending; and what is of equally valuable importance, the required "set" of the plate is obtained to a nicety, and with perfect ease. The *Revue Industrielle* describes and illustrates in a recent issue,

FARCOT'S CONTINUOUS ILLUMINATING GAS PROCESS.

His apparatus consists of a short iron charging hopper, from the lower end of which elevator buckets carry the coal to the retort. The latter is a cast-iron or fire-clay box, within which a circular disk mounted on a vertical shaft slowly revolves. The fresh coal is distilled during the time required for about one revolution, as it is carried from off the table by a cast-iron shield under which the former moves. The gas made is washed and purified in the usual manner.

Mr. W. Finlay, in a letter to *Engineering*, bears witness to the efficiency of

THE PERKINS HIGH-PRESSURE ENGINES.

He states that a 25-horse-power engine, working 10 hours a day for seven years at a pressure of 350 lbs. per square inch, has used 3 1/2 cwt. of coal and half a gallon of distilled water per day. A second 50-horse-power engine has, with the same pressure, worked 2 1/2 years with 5 1/2 cwt. of coal and 2 1/2 gallons of water per day of 10 hours. A 200-horse-power engine, worked only up to 100-horse-power for six months, has a pressure of 375 lbs., with 11 1/4 cwt. of coal and 3 1/2 gallons of distilled water per day.

Dr. Neumayer has presented to the Geographical Society of Berlin, a remarkable photographic apparatus for determining

THE TEMPERATURE AND CURRENTS OF THE OCEAN.

It consists of a brass box hermetically closed, and having attached to it an apparatus resembling a vane or rudder. Within this box a thermometer and a magnetic needle are contained, behind each of which is placed sensitive photographic paper, and in front of each of them a small nitrogen vacuum tube. The box also contains a small induction coil. When the apparatus is lowered to the required depth, the rudder causes it to take a direction parallel to the current there existing, and hence a definite direction with reference to the needle within. The thermometer soon acquires the temperature of the water outside and becomes stationary. At this instant an electric current is sent to the box, which, by means of the induction coil inside, lights up the little nitrogen tube, the violet light of which, photographically very intense, prints, in about three minutes, the position of the needle and the height of the mercury column upon the prepared paper. The current is then interrupted, the apparatus raised, the photographic tracing fixed, examined and placed upon record.

Among the various explosives which have been introduced to supersede gunpowder for special purposes, gun-cotton still maintains the foremost place. For submarine mining operations it has no equal, owing to the fact that it is not liable to deterioration when exposed to moisture. Recent experiments have conclusively shown that this substance may be as successfully exploded by detonation when submerged in water and confined only in a rope net, as when inclosed in an air-tight iron case. According to the *Universal Engineer*, recent

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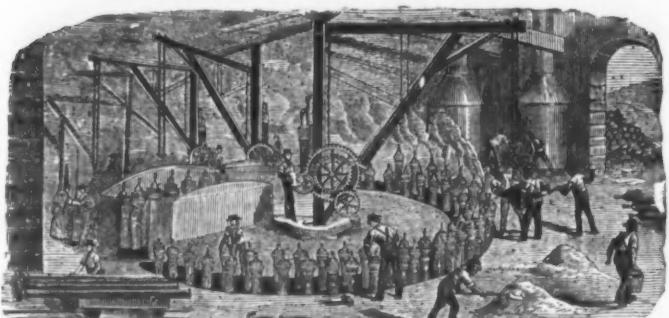
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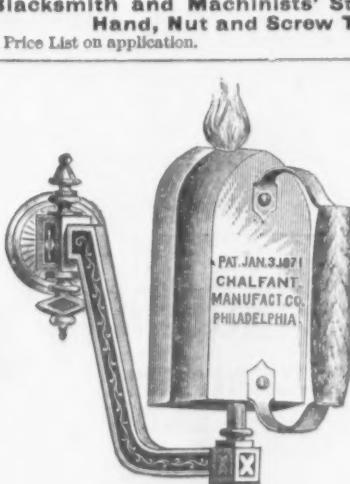
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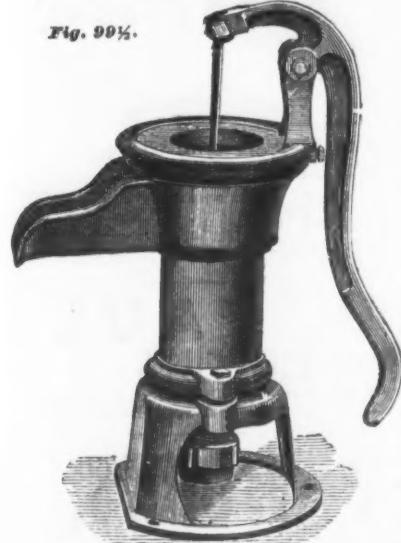
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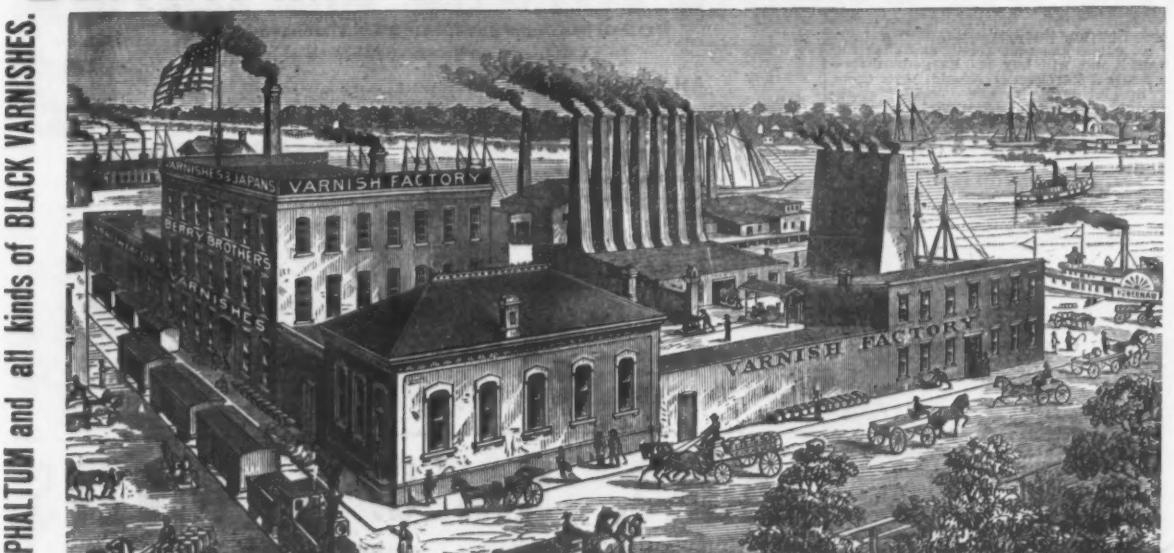
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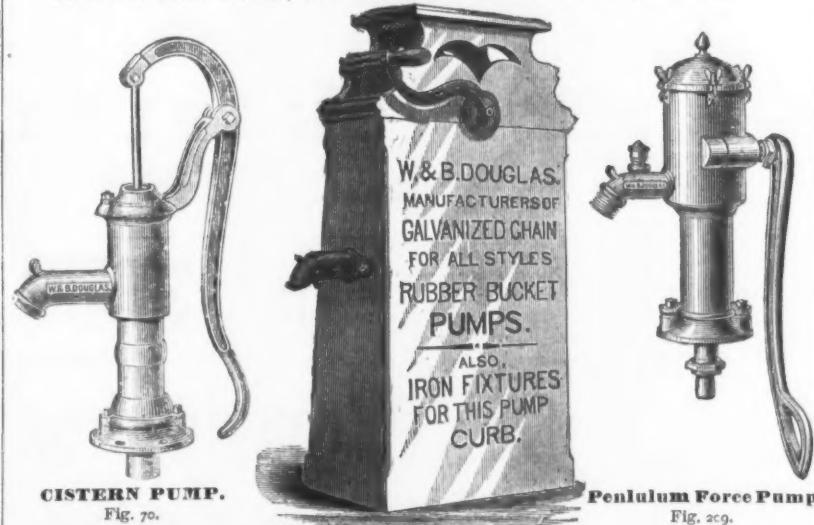
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The Barff Process for the Protection of Iron.

The Barff process for the protection of iron surfaces from rust has been before the public, in one form or another, for several years, and great interest has been manifested by manufacturers in the methods by which the results have been accomplished. Professor Barff, however, does not appear to be satisfied with his apparatus, for, although it has been described in a general way, no details of a satisfactory nature have been made public. The readers of *The Metal Worker* are aware, from the articles which have appeared in its columns, that the object of the process is to deposit a thin film of the black or magnetic oxide which shall be closely adherent to the iron treated. As this oxide is almost unchangeable by any ordinary means, a perfect protection against rust is given to the iron beneath.

The great difficulty which was first experienced was in securing the adherence of the coating, which was obtained by the exposure of the iron to be coated by the action of steam in a heated chamber. At first saturated steam was employed, which produced a covering of red oxide, reduced by the liberated hydrogen to metallic iron, and subsequently converted into black oxide as the steam became superheated. This

A, the flow being controlled by the cock C. It escaped from the treating chamber or muffle A into the air by means of the pipe D.

The changes which would be necessary in this apparatus to make it effective are so simple as to suggest themselves to almost anyone. Fig. 2 shows the arrangement finally adopted. Here steam is generated in the boiler B, which is furnished with a safety valve in the usual manner. The pressure employed is about 10 pounds per square inch. Steam passes from the boiler through the pipe to the superheater C. The latter is a coil of pipe, seen endwise in the drawing, consisting of some 40 feet of 1-inch pipe. It is protected at both sides and ends from the direct action of the flame by fire-brick, as shown. From the superheater the steam passes by the pipe C to the treating chamber or muffle A, which is kept hot by a separate furnace. This furnace has flues which pass up on each side of the muffle and unite above. The muffle itself is made of fire-brick, which, all things considered, has been found to be the best material for the purpose, being superior to iron. The excess of steam and hydrogen passes off through the pipe D, and is discharged into the ashpit of the boiler furnace. Economy would suggest that a much neater and cheaper arrangement would be to employ a gas producer on a small scale, and save entirely one of the furnaces. Besides

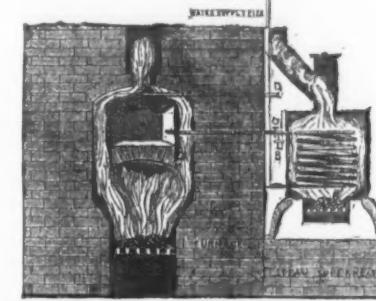


Fig. 1.—First Form of Apparatus.

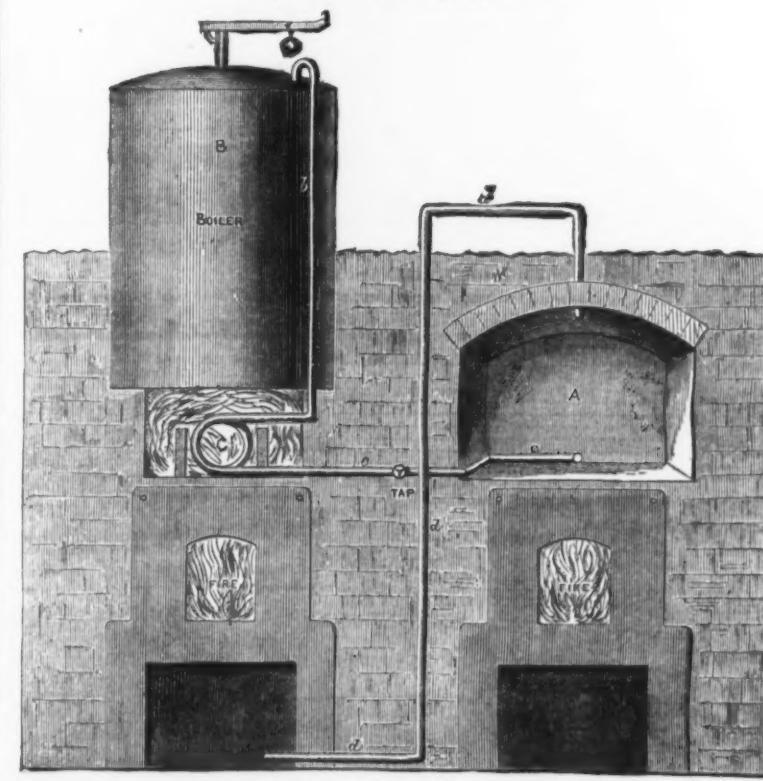


Fig. 2.—Present Form of Apparatus.

THE BARFF PROCESS FOR THE PROTECTION OF IRON.

oxide, however, remained generally in the form of minute scales on the surface, which could be freely detached. While many of the specimens produced in this way showed no signs of rust under very severe tests, others—and by far the greater proportion of them—at once showed indications of rust, which appeared as specks upon the surface. Rust starting in this way soon spoiled the work. It was found, however, after very long experiment, that by the use of superheated steam instead of saturated, the coating of the black oxide became continuous and permanent, and was so closely adherent to the surface that considerable difficulty was found in detaching it.

Fig. 1 shows the form of apparatus first designed for the application of superheated steam to this purpose. The superheater consisted of a coil of pipe placed within a furnace. One end of this coil extended upward for a height of 34 feet, and entered a cistern which was kept supplied with water; the other end entered an iron chamber placed above a furnace. This chamber was furnished with an iron door, in which a tube was fixed to allow of the escape of the hydrogen formed during the process. The water entering at one end of the coil passed out at the other in the form of superheated steam.

Several difficulties attended this form of apparatus, the chief being that the steam frequently passed into the chamber without being superheated, and the result was the formation of a loose black oxide on the surface to be protected; air also sometimes penetrated into the furnace. In fact, anyone even slightly familiar with steam and its action, and knowing that continuous supply of superheated steam was necessary, would pronounce this apparatus faulty. The attempt to obtain even dry steam by passing water into a coil of pipe placed in this method in a furnace, is altogether impracticable, unless a separator is used. An example illustrating this point is found in the famous Herreshoff coil boiler, so widely known in connection with fast steam launches and steam yachts. In this boiler, Mr. Herreshoff from the first used a large separator to prevent water from passing into the engine, and in this way obtained perfectly dry steam. In Fig. 1 it will be observed that the steam passes at once from the coil into the chamber

being much cheaper, it would make less trouble in operation. This would be done by carrying a very deep fire under the boiler, say 2 feet thick, and taking the gases obtained from it into a combustion chamber beneath the muffle. Ample heat could be obtained for the production of the small amount of steam needed to keep up the supply for the muffle, while the gas flame around the muffle would be very easily managed. In carrying out the process the muffle is first heated to a temperature of about 500 degrees, when the articles to be treated are introduced, the door is closed, and the temperature is restored. The superheated steam is then admitted, and after a period varying from five to ten hours, the surfaces to be treated are covered with a protecting coat of black oxide. This film is a very good protection against oxidation, and has good degree of hardness. In this respect it appears to be decidedly superior to any of the enamels now in use. It has the great advantage of withstanding a considerable temperature without undergoing any change. In color the coating is somewhat like that of casting fresh from the pickle. It is, however, lighter and by no means as handsome.

This apparatus is at work on a commercial scale in London, where muffles are in use of considerable size, the largest being 7 feet wide, 3 feet high, and 12 feet long.

As a submarine engineer Gen. Newton has acquired a wide fame, and is familiar with explosions, but in his proposed improvement of Flushing Bay, L. I., by extending a dyke along the channel—now closed to navigation—he encounters much explosive material, and finds himself in hot water at the very outset of the undertaking. The estimate of cost for a double row of piles, filled in between with stones, so as to form a tidal reservoir between the dyke and the Newtown shore, is \$175,000. Gen. Newton lately signed a contract with Henry DuBois & Sons, of this city, to drive the necessary piling for \$17,000. At this juncture the inhabitants of Newtown, with the aid of Congressman Covert, a brass cannon, &c., held a tumultuous meeting a few nights ago, at which the question was warmly discussed, to be renewed at another time.

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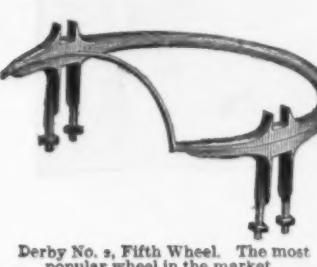
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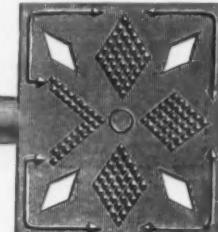
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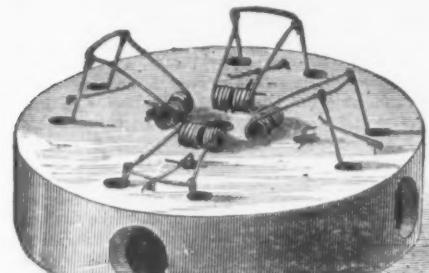
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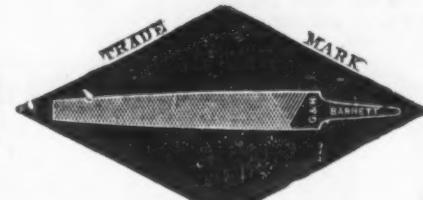
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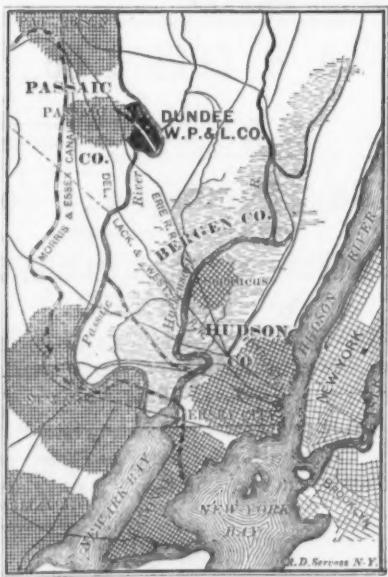
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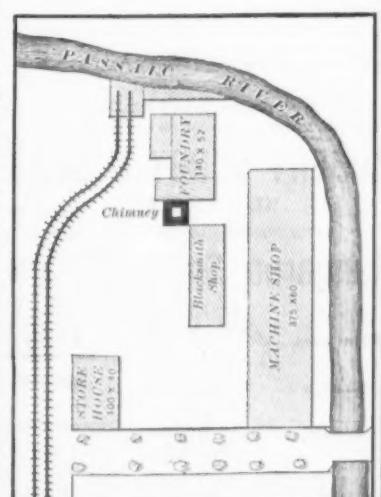
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Manufacturer of
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Cut Showing Round Platform.



This Cut is the Actual Size of 2-inch.

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Maker and Patentee of the Improved

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Punches.

ROLLER TUBE EXPANDERS AND DIRECT ACTING STEAM HAMMERS.
Communications by letter will receive prompt attention.

JACKS FOR PRESSING ON CAR WHEELS OR CRANK PINES MADE TO ORDER.

EVERY PUTNAM NAIL IS DRAWN DOWN TO A POINT FROM THE ROD, THUS:

IT IS THE ONLY HOT FORGED AND HAMMER POINTED HORSE SHOE NAIL, MADE BY MACHINERY, IN THE WORLD.

Some other manufacturers claim to make a hot forged nail, but you will observe on all such a sheared edge near the point.

THE PUTNAM NAIL CO., BOSTON.

INDUSTRIAL ITEMS.

MAINE.

The Katahdin Furnace was relined in October to 10x50 feet; a new 150-horse-power wheel was added. A new roasting kiln for ore and coal kilns will be built in the spring, when the capacity of the furnace will be increased to 140 tons a week. The furnace is now making a first-class car wheel iron.

NEW HAMPSHIRE.

C. E. Marston, of Dover, has just finished a new building for a machine shop in connection with his foundry, and has just begun to receive the tools. He will make a specialty of pulleys, shafting, hangers, &c., and do general jobbing business.

MASSACHUSETTS.

The Vitrified Wheel Company, of Westfield, have invented a new cutting wheel made of "corundum," which is said to be nearly as hard as diamond and much harder than emery.

The Putnam Nail Company elected the following directors: John S. Fogg, W. W. Whitmarsh, John H. Buttrick, John Mears, C. O. Blanchard, W. S. Packer and B. F. White. At a subsequent meeting of the directors, B. F. White was chosen president; John S. Fogg, vice-president; W. W. Whitmarsh, treasurer, and John Mears, secretary, and the following executive committee: B. F. White, J. H. Buttrick and J. S. Fogg.

The Hinkley Locomotive Works, on Albany street, Boston, together with wharf property, machinery, stock on hand and all other assets of the company, were sold at auction by order of the trustees on Wednesday, Jan. 14. Alexander H. Porter, agent, was the purchaser. The price was \$201,000 over two mortgages of \$180,000 and the tax for 1879.

The Bay State Iron Works at South Boston are running their plate and puddle mills day and night. Their output during the last month was about 1500 tons of plates, of which about 150 tons was steel, rolled for the Norwalk Iron Works.

CONNECTICUT.

The Chapinville furnace has been burned and the stack destroyed. This leaves virtually but eight furnaces in the Salisbury Region of Connecticut.

Collinsville, it is said, is to erect a furnace for the manufacture of charcoal iron.—*Connecticut News*.

The Stewart Machine Company of New York have leased the screw company building on Sheldon street, and will take possession June 1, and employ a large number of hands. The Pratt & Whitney Company are building 60 knitting machines for the Shaw Stocking Company of Lowell, Mass., and also file cutting machines for a new company in Providence. A. F. Cushman is driving his works in making lathes and drill chucks. A new drill chuck with several important improvements is now being made. Peter Amerman is making a large boiler for the tug boat Farragut, besides being very busy on job-work, and boilers for the Baxter engine.—*Hartford Courant*.

NEW YORK.

The Carthage (C. C.) Furnace was recently banked for three weeks, the roads being so bad it was impossible to get coal to the furnace. They have burnt 150,000 bushels of coal and as much more is under way.

PENNSYLVANIA.

Mr. J. C. Fuller, President of the Pine Grove Furnace Company, has ordered an advance of wages averaging 12 1/2 per cent., to take effect on Feb. 1. This is the second advance made without solicitation of the employees since Oct. 1, and increases their earnings since that time 20 per cent.

The Altoona Tribune says that the first cut nails made in Central Pennsylvania were manufactured over fifty years ago by Robert McNamara, in Newry, Blair County. The same paper says that sixty years ago nails were made in Alexandria, Huntingdon County.

The new muck mill of the Potts Bros. Iron Company (Limited) is in operation, five double puddling furnaces and three heating furnaces running double turn. The firm make a specialty of skele and boiler tube iron, on both of which they are running full. Their first or original works were erected in 1845 and '46 by Henry Potts, of Pottstown, and David Potts, of Warwick, Chester County, who were associated together under the firm name of Henry Potts & Co., and were the first and for a long while the only iron works in Pottstown. The old mill stood until some few years ago, when the old buildings were torn down and new ones put up by the Potts Brothers, into whose possession the works had passed. About a year ago a limited stock company was formed, consisting of the following members: Henry Potts, Jr.; George H. Potts, Henry W. Potts and Joseph D. Potts. These gentlemen finding that the old works were too small, concluded upon the erection of a large addition to the old mill and the putting up of three more double puddling furnaces, a new engine, squeezer and roll train. With the new works in operation, the firm will give employment to from 125 to 150 persons.

The mill at Greenville, Pa., is on double turn in all departments, and running to its fullest capacity, with splendid prospects for a long and steady run.

The Harrisburg Patriot learns that another important furnace, known as the Porter or Price Furnace, has been bought by parties who are now busy making preparations to put it in blast. We also learn that they have made a very extensive purchase of iron ore lands and leases in the Cumberland Valley from the Messrs. Ahl.

The E. & G. Brooke Iron Company, at Birdsboro, has been incorporated. It consists of the estate of Edward Brooke, deceased, with George Brooke, and with George L. Harrison, Hester Clymer and George F. Baer. The capital of the corporation is \$600,000, and it takes all the real estate, mines, mineral rights (35 properties, consisting of furnaces, rolling mill, nail factory, machine shops, foundry, ore machinery and ore lands valued at \$600,000), the old firm of E. & G. Brooke.

The Moselem Furnace has just blown out, this being the third time in two years and a

half. The occasion was a scaffold, and the firm thought it best to blow out rather than experiment. But little damage was done, the in-wall being good. The repairs will be in the bosh. The furnace will blow at an early date.

The Chester Steel Castings Co. have doubled the capacity of their works at Chester, by extending their main building and adding to it an L, 60 x 80. They are now filling large orders for steel castings from all parts of the country.

The Lehigh Valley Emery Wheel Co., Weisport, are busier this season than they have been for four years.

The Lehigh Stove and Manufacturing Co., of Lehighton, is running with a larger force of hands than for a number of years.

A capitalist of Mauch Chunk is negotiating for the purchase of the Fort Allen Rolling Mill, of Weisport. If the purchase is consummated, the new proprietor will double the capacity of the works, and will put them in operation at an early day.

Miner Bros. Foundry, at Weisport, is running to its fullest capacity. They employ about 60 hands. Their work consists chiefly of light castings, such as sewing machines and water-closet work.

Both furnaces of the Spearman Iron Co., at Sharpsville, are now in blast. These furnaces make an extra quality of iron that always commands an advance over the quotations of the Pittsburgh market.

The Frankstown Furnace is out of blast for repairs. It will blow in again about the first of March.

One of the Kemble Furnaces is in blast, the other is out, but is being got ready to blow.

George W. Smith, of Pittsburgh, proprietor of the Lower Maria Forge and Sarah Furnace properties, proposes to erect a new furnace on the Lower Maria Forge property, at or near Roman Furnace, early in the spring, or as soon as the weather will permit.

Nearly 50 men are employed at the new tank works of the Reading Iron Works. It is expected that nine tanks will be turned out each week.

The Camden Tool and Pipe Works, a part of the Reading Iron Works, are now in operation in all departments. The tool works have never been entirely idle, but the pipe works have been idle for two and a half years.

The Edge Hill Furnace is ready to blow in. H. M. North has sold his Kauffman furnace property—the Cordelia blast furnace and farm land in West Hempfield, and the Figely ore bank, in York county—to Isaac McHose, a prominent and leading iron man of Reading. It will be run by Mr. McHose, who has had a thorough experience in the furnace business, in connection with other parties, and will be in blast shortly. Mr. McHose will be general manager and treasurer of the company, the name of which has not been decided upon.

In refining the Erie Blast Furnace, it was made 65 x 13 1/2 feet, with 6 feet hearth.

Out of the nine furnaces at Sharpsville, five are in blast.

Six of the seven furnaces in New Castle are now in blast.

The scale works of Riehle Bros., Philadelphia, have been running until 9 o'clock every evening, having large orders for beams and other weighing apparatus for the custom house at the chief cities throughout the country. They are in receipt of an order for a testing machine of 150,000 lbs. capacity, for the Bethlehem Iron Company, a new design with all the latest improvements. They report also a great demand for their patent self-adjusting railroad track scales and furnace charging scales.

One of the Glamorgan Furnaces has just blown out for a new hearth.

Messrs. Hunter & Springer are constructing a new cold-blast charcoal furnace at Chambersburg, which will be in blast about May 1. It will be 40 feet high and 9 feet boshes.

Every furnace in the Lehigh Valley will soon be in operation. But six were idle January 1.

The Allentown Rolling Mill Company, of Allentown, have leased the Glen Rolling Mill, at Allentown, which will be run chiefly on puddled iron. The mill, when repaired, will have eight double puddling furnaces. This will enable the company to meet the increasing demand for light rails and other specialties, which for some time past has been beyond their capacity.

Messrs. Edward Samuel & Co., of Philadelphia, have recently issued a neat pocket pamphlet containing printed information, with illustrations, relative to railway materials, which is valuable to civil engineers and others engaged in railway construction.

PITTSBURGH AND VICINITY.

James McNeil & Bro., of the Vulcan Boiler Works, are soon to have built an addition to their works which, when completed, will double the present capacity. The proposed building is to be 120x50 feet. They will put in new boilers and engines and some additional machinery.

The old shops of the Pennsylvania railroad at Swissvale are to be put in good shape and started up in a short time under a new management. The works have been idle for some time.

It is said some parties from Pittsburgh are considering the propriety of purchasing some lots in Blairsville, having in view the erection of novelty works.

Messrs. Park, Long & Co. are making additions to their machinery that will nearly double their capacity.

The hoe factory at Monongahela City is under roof, and the machinery will be placed in position as soon as possible.

Wilson, Walker & Co., of the Union Forge and Iron Mills, have lately added a 2000-pound helve hammer to their forge department. An addition 72x17 feet is being built for a new 3000-pound steam upright hammer, with the blacksmiths' fires necessary to work the product.

It is rumored that Graff, Bennett & Co. have bought the old Rough Run Furnace property, up Buffalo creek, near Freeport, and will immediately put it in operation. This furnace has not been in operation since the days of the Pennsylvania canal, over twenty years ago.

The product of the "A" furnace of the

Cutlery.

FRIEDMANN & LAUTERJUNG,

Manufacturers of

PEN AND POCKET CUTLERY,
Solid Steel Scissors, Shears, Razors, &c.Sole proprietors of the renowned full concave
"ELECTRIC RAZORS,"

And the celebrated "ELECTRIC SHEARS." Nickel Plated Bows.

Agents for the BENGAL RAZORS.

AMERICAN TABLE CUTLERY, BUTCHER KNIVES, &c. 91 Chambers and 73 Reade Sts., N. Y. 423 N. First St., St. Louis, Mo.

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THE "PATENT IVORY" HANDLE TABLE KNIFE.

The oldest manufacturers of Table Cutlery in America. Exclusive makers of the CELLULOID HANDLE for Table Cutlery. A most beautiful and perfect substitute for Ivory. Also makers of all kinds of TABLE, BUTCHER AND HUNTING KNIVES. Illustrated catalogues with prices sent to the trade on application. No. 48 Chambers Street, New York.



Spoons, Forks, Knives, Etc.



The only survivor of the four Rogers; recognized by the Supreme Court of this State in the test trial vs. C. Parker. Send for list of other patterns.

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Formerly of Hartford and West Meriden. With SIMPSON, HALL MILLER & CO.



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The Celebrated VICTOR Cast Shear GOLD HARDWARE & NOTION DEALERS EVERY WHERE. Special Attention given to orders for export. Manufactured only by THE RENZ HARDWARE CO. BRIDGEPORT, CONN. U.S.A.



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Penfield Block Works, LOCKPORT, N. Y., Wrought Iron and Wood Shell TACKLE BLOCKS.

All Steel Roller Bushings, and Roller Bushed Iron heaves. CARPENTER MALLETS Of every description. Giant Car Pusher and Faucets.

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Quality, finish and tests as to strength, guaranteed equal to any in the market. With improved facilities and largely increased capacity for production, we can fill orders promptly, and invite inquiries for discounts.

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BALL'S PAT. SOLID STEEL SHEEP SHEARS.

These shears are unsurpassed for cheapness, durability and utility. They are made of one solid piece of steel from point to point, and cannot be broken in use either in the bow or at the junction of the shank and blade. Samples can be seen at above address, or sample lots furnished.



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Kangaroo Sheep Shears,

The best CORPORATE MARK

Shears

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Every Shears

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Send for Illustrated Catalogue.

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Tucker's Incomparable ADJUSTABLE STOVE TRUCK.

Packed One Dozen

In a box.

Patented, Oct. 18, 1878. Oct. 1, 1878. July 1, 1878.

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Observe what absolute power—prying up on one chain and down on the other.

Fuller 1 1/4 inch on short bars.

Fuller 1 1/2 inch on long bars.

Fuller 1 1/4 inch at pleasure.

The power of the stumps gives the power of the Fuller as desired.

Simple, Cheap, Light.

Durable, short hitch, Adapted to strength of Horse.

We make full either for Coin or Script.

SUSCEPTIBLE OF 32 CHANCES — A — PERFECT DAY SAFE.

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FREDERICK'S 3-HORSE EQUALIZER is a perfect Double Tree, a perfect Tripple Tree, a perfect 2-Horse Stretcher, a perfect 3-Horse Stretcher, a perfect attachment for either 2 or 3 horses anywhere. Just the thing for spring plowing.

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Pocket Knives and Scissors.

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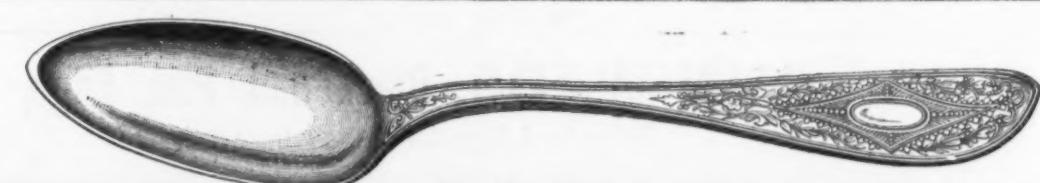
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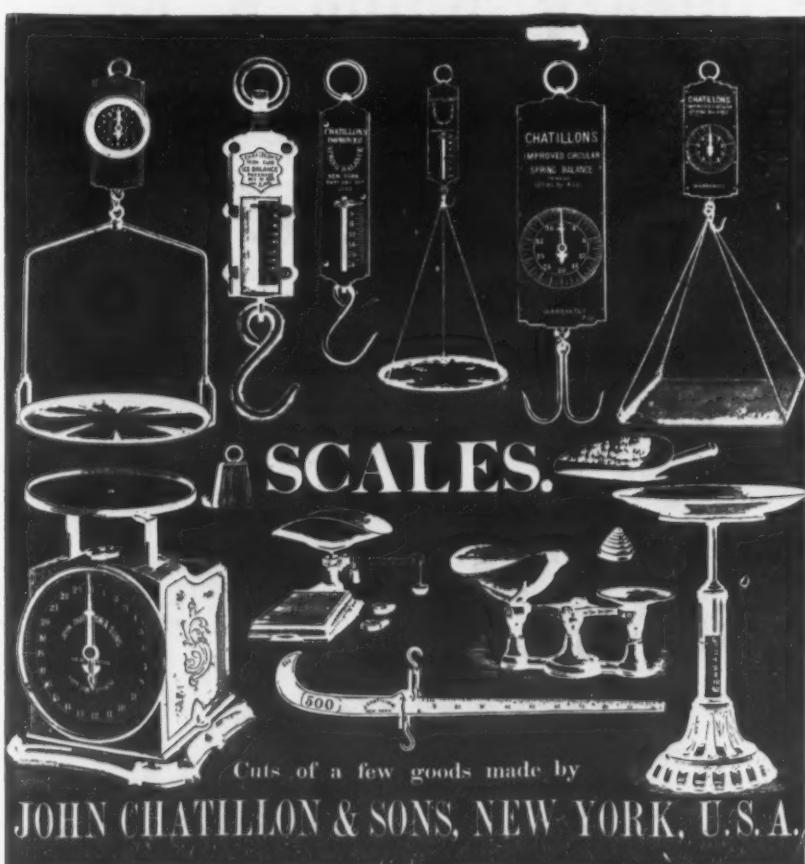
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Four Pointed Steel Barbed Cable Fence Wire,
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Outfits complete, with Dynamo-Electric Machine Tanks, Anodes, Solution, &c., \$250.

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We are furnishing outfitts specially adapted for Stove Work, giving a pure white deposit on plain or mat surfaces.

Outfits complete, with Dynamo-Electric Machine Tanks, Anodes, Solution, &c., \$250.

We beg to refer to the following Stove Manufacturers among 500 other houses using the Weston Machine: Richardson & Boynton, S. S. Jewett & Co., F. W. Warren & Co., Perry & Co., Detroit Stove Works, Michigan Stove Co., Co-operative Stove Co., E. & C. Gurney, Hamilton & Toronto, and many others.

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H. D. SMITH & CO.,

Plantsville, Conn.,

Manufacturers of the

BEST QUALITY CARRIAGE MAKERS' HARDWARE.

Manufacture the Largest Variety of Forged Carriage Irons of Best Material and Workmanship.

PRICES LOW FOR QUALITY OF WORK FURNISHED.

SEND FOR PRICE LIST.

SARANAC HORSE NAIL CO.

Polished or Blued Horse Nails, Hammered and Finished.

The Saranac Nails are hammered hot and the finishing and pointing are done cold. Quality is fully guaranteed. For sale by all leading iron and hardware houses.

S. P. BOWEN, President and Treasurer.

J. W. LYNDE, Secretary.

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STERLING & CO., Agents, 7 and 9 Cliff Street, New York.

METALLIC AMMUNITION,

Rim and Central Fire, all Sizes.

GUN WADS, Black and Pink Edge,

Guaranteed Superior to any Imported.

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PRICE LISTS WITH DISCOUNTS TO THE JOBBING TRADE ON APPLICATION.

PERCUSSION CAPS.

F. C. Trimmed Edge, W. Proof.

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Musket, Paper and Tin Boxes.

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PAPER and BRASS SHOT SHELLS.

PAPER.

Celebrated "U. M. C." Sizes, 8, 10, 12, 14, 16, 20, Central Fire.

BRASS.

Berdan, Solid Anvil. Sturtevant, Movable Anvil. Buffington, Movable Anvil
Berdan Primer.

Kenney's Patent Indentation to prevent Wads from starting.

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FARLEY'S PATENT
Rubber-Cushioned Casting Brush.
Superior to any in the Market.



Manufactured and for sale in the
L. B. FLANDERS MACHINE WORKS,
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Descriptive Circular on application.



Bemis & Call Hardware & Tool Co.
These Wrenches are made from the best of Wrought Iron, with Steel Head and Jaw, case-hardened throughout, and not only combine all of the superior qualities of our Cylinder or Gas Pipe Wrenches, but also all requisite Combinations of a regular Nut Wrench, thus making a combination which has no equal.

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BEMIS & CALL HARDWARE & TOOL CO., Springfield, Mass.



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Manufacturers of
GRASS, GRAIN & BUSH SCYTHES,
HAY KNIVES & CORN KNIVES,
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See our advertisement in *The Iron Age* first issue of each month.

EAGLE FACING MILLS AND PLUMBAGO WORKS,
CINCINNATI, O.

MANUFACTURERS OF

Foundry Facings and Blackings, Black Lead and
Lubricating Plumbago.

Foundry Supplies, Monk's Molders' Tools, Molding Sands.
Our Return Facings are used by all first-class Stove Manufacturers. Our Heavy Blackings are used by the U. S. Government, by the leading Railroad Foundries, and wherever heavy castings are made.

QUALITY GUARANTEED THE BEST. SEND FOR PRICES.
S. OBERMAYER & CO., Prop's.

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PITTSBURGH.

**SHOVELS,
SPADES and
SCOOPS.**

PATENT

ANTI-WINDOW

RATTLER,

FOR

Dwellings, Cars, Steamboats, &c.

The Anti-Window Rattler supplies a long needed want; it is so simple in construction that it can be used on any window, and so complete that it will prevent the slightest shaking, no matter what the glass frame; is ornamental as well as useful, and does not interfere with raising or lowering the sash.

HEATON & DENCKLA,
General Agents,
507 Commerce St., Philadelphia.

GRAHAM & HAINES,
Agents,
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OTIS D. DANA,
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Vulcanized Rubber Fabrics
ADAPTED TO
MECHANICAL PURPOSES.
RUBBER BELTING and PACKING.

Machine Belting,
Steam Packing,
Leading Hose,
Suction Hose,
Grain Elevator
Belting,
Steam Hose,
Piston-Rod
Packing,
Gaskets and Rings.

RUBBER BELT
WEIGHT—ADDOANT
LENGTH—300 FEET
WIDTH—4 FEET
MADE BY
N.Y. BELTING CO.
PROVIDENCE

VACUUM PUMP
VALVES,
BALL VALVES,
CAR SPRINGS,
WAGON SPRINGS,
GAS TUBING,
MACHINE BELTING,
WRINGER ROLLS,
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GRAIN DRILL TUBES,
EMERY WHEELS.

This company manufactured the famous DRIVING and ELEVATOR BELTS for the Buckingham Elevators at Chicago, which have been running perfectly for more than Twelve Years, also those for ARMSTRONG'S Co., Chicago, and Vanderbilt's great elevators of the New York Central and Hudson R. R., New York, being the Largest Belts in the World! We are now making an Elevator Belt, 36 inches wide and 300 feet in length, which will weigh over 18,000 pounds.

LINEN and COTTON HOSE.
Pat. 5545.
Plain and Rubber Lined.
Circular Woven-Seamless Antiseptic RUBBER LINED "CABLE" HOSE and "TEST" HOSE, Vulcanized Para Rubber and Carbolized Duck, for the use of Steam and Hand Fire Engines, Force Pumps, Mills, Factories, Steamers, Ships, Hospitals, &c.
"TEST" HOSE.
"CABLE" ANTISEPTIC.

Emery Wheels and Packing.
Patented.

**ORIGINAL
Solid Vulcanite
EMERY WHEELS**
LARGE WHEELS MADE ON CAST-IRON CENTER IF DESIRED.
Emery Wheel.

The properties of these Wheels are such that they can be used with great advantage and economy for cutting, grinding, and finishing Wrought and Cast Iron, Chilled Iron, Hardened Steel, Slate, Marble, Glass, etc. These Wheels are extensively used by manufacturers of Hardware, Cutlery, Edge Tools, Plows, Safes, Stoves, Fire Arms, Wagon Springs, Axles, Skates, Agricultural Implements, and small Machinery of almost every description.

**PATENT ELASTIC
Rubber Back Square Packing**
BEST IN THE WORLD.
For Packing the Piston Rods & Valve Seats of Steam Engines & Pumps.

B represents that part of the packing which, when in use, is in contact with the Piston rod. A is the elastic back, which keeps the part B against the rod with sufficient pressure to be steam tight, and yet creates but little friction.

This Packing is made in lengths of about 20 feet, and of all sizes from $\frac{1}{2}$ to 2 inches square.

Corrugated Rubber Mats and Matting,
Pat. 11,308, 213,001.
For Halls, Flooring, Stone and
Iron Stairways, &c.

This practical and indispensable article—especially for wear where exposed to ice, snow, or slush—was first introduced by this company several years ago, and its real value is in being almost indestructible, when proper materials are used in its manufacture, whilst the cheap, inferior quality forced on the public by reckless imitators of our patent goods soon becomes brittle and crumbles to pieces. Address

NEW YORK BELTING & PACKING CO.,
Warehouse, 37 and 38 Park Row, New York.
JOHN H. CHEEVER, Treasurer.

BLACK AND TINNED IRON RIVETS.



**W. P. TOWNSEND & CO.,
PITTSBURGH PA.,**

Manufacturers of every description of First Quality

RIVETS.

[See advertisement in The Iron Age of January 1, 1880.]

**WHEELER & MELICK CO.,
ALBANY, NEW YORK, U. S. A.,**

Manufacturers of

**IMPROVED FARM IMPLEMENTS
AND MACHINERY.**

PROVIDENCE TOOL CO.

Providence, New York, Boston, Chicago.



Wrist & Ankle Shackles.

REVERSIBLE

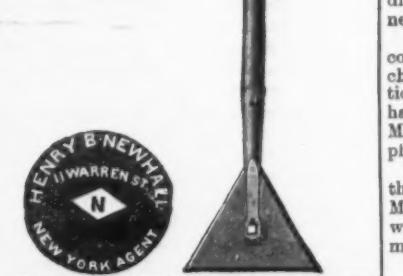
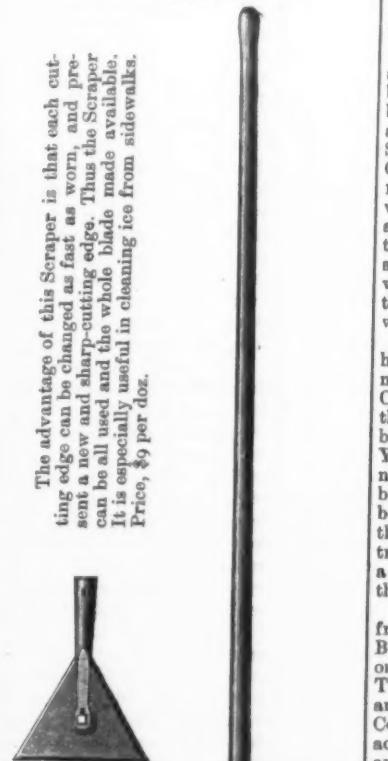
ICE AND FLOOR SCRAPERS,

MADE BY

PROVIDENCE TOOL CO.,

Providence, R. I.

The advantage of this Scraper is that each cutting edge can be changed as fast as worn, and present a new and sharp-cutting edge. Thus the Scraper can be all used and the whole blade made available. It is especially useful in cleaning ice from sidewalks. Price, \$9 per doz.

HENRY B. NEWHALL
N.Y. NEW YORK AGENT

FRANKLIN S. MILES,
Manufacturer of
Brass, Iron, Steel and German Silver
SCREWS,
205 Quince Street, Philadelphia.

N. Y. MALLET and HANDLE WORKS

Manufacturers of
Calkers', Carpenters', Stone Cutters',
Tin, Copper and Roller Makers'

MALLETS,

Hawing Beaters, Hawing and Calking Irons: also all kinds of Handles, Sledge, Chisel and Hammer Handles. Also

COTTON AND BALE HOOKS,
Patented Feb. 13, 1877; a new combination of Hooks.
456 E. Houston St., New York City.

THE FAR-FAMED
AMERICAN LUBRICATOR
AMERICAN LUBRICATOR CO.
DETROIT, MICH. U. S. A.

SEND FOR PAMPHLET.

have already been commenced, the owner having contracted with Mr. Henry Bengold for working the bed.

COAL.

The steel rope used in hoisting cars on Mahanoy Plane, in the anthracite region, costs \$5672, and is used only for 2,000,000 tons. The one now in use will be taken off after a service of seven months.

It is anticipated that the product of the Schuylkill region next year will reach 9,000,000 tons, of which the Coal and Iron Company will supply at least one-half, and from the facilities now on hand and others that will be available during the year, it will be in a position to increase its output fully up to the extra demands made upon it. At the Merriam Colliery, where a tunnel nearly 1300 feet long has been driven to the Mammoth, the coal in the cut is 19 feet 7 inches, and is in splendid condition. In addition to other acquisitions previously noted, the company has recently taken possession of the Tunnel Ridge Colliery at Mahanoy City, and after some needed repairs will start operations. At Tunnel and Keystone Celleries new lifts are being sunk, and these works will be again in operation during the season. Altogether the prospect both for the operators and the miners and laborers is very encouraging—much more so, we may say, than it has been at the beginning of any previous year within the last decade.

Hard coal has been found at a depth of 25 feet, 12 miles northeast of Emerson, Winnipeg, Manitoba.

Some idea of the importance of water as an element in the cost of mining coal may be had from the statement recently made before the courts in the case of Sanderson against the Pennsylvania Coal Company, at Scranton, where it was asserted that in the Gipsy Grove Colliery, which mined about 100,000 tons of coal a year, the amount of water pumped during the same time reached a million tons, or ten tons of water for every ton of coal. A Mr. Post made the further statement that there were more tons of water pumped from the Diamond Colliery than tons of coal mined in the entire Lackawanna District.

Col. A. J. Hill, of Fayette County, Pa., has sold his extensive coal field near Connellsville, on a royalty, to Mr. Rainey, of Cleveland, Ohio. This is said to be one of the best bodies of coal in the Connellsville basin. It is situated on the west side of the Youghiogheny river, four miles below Connellsville, and to operate it necessitates the bridging of the river, work upon which will be commenced immediately. It is said that the daily receipts of Col. Hill, under his contract with Mr. Rainey, will amount to \$100 a day. His father, A. M. Hill, was one of the pioneers of the Connellsville coke trade.

The statement is denied that there is a freight pool existing between the Lake Erie, B. & O. and Pennsylvania lines, the pool only including the one item of coke. Mr. Tom Scott, Jr., is the secretary of this pool, and reports the business to the High Joint Commission, a board of railroad men who act as umpires over any question which may arise. The average is 600 cars of coke per diem, and how the business is divided has never been made public.

Men have begun the work of putting the coke ovens at New Castle, Pa., and the machinery in condition for immediate operation. Prominent among the capitalists who have the ovens is S. D. Oliphant, of Pardo, Mercer County; his brother, Hugh Oliphant, and a gentleman from Pittsburgh.

Charles A. Armstrong & Son have leased the Catt's Run Coke Works, located on the Monongahela River, below New Geneva, and will commence business as soon as they can make the necessary repairs.

Interchangeable Bolts and Nuts.

A subject of much importance to manufacturers, car builders, tap and die makers and rolling mill proprietors was again discussed at length at a recent meeting of the master car builders, the topic being: "The standard system of screw threads, and the best method of maintaining exact sizes of screws so that bolts and nuts may be interchangeable." Mr. Wm. Sellers, who was present by invitation, argued that the difficulty experienced by master car builders did not appear to have its origin in the Franklin Institute standard system, but that it appeared to resolve into this: How can it be ascertained what is a correct inch or quarter-inch or half-inch? It would not make any difference if all adopted the Sellers' standards of measurement, or if all adopted any of the standards and were satisfied to work to that particular one.

When he proposed this system of screw threads, he supposed that everybody would make his own taps and dies as heretofore, and it was his hope that an interchangeable system would result, because everybody would make his own in the easiest and simplest way. Sellers & Co. continued to make their own taps and dies for a long while, but, in process of time, manufacturers of the standard taps and dies grew up in the country, and they found that it was cheaper to buy than it was to make them themselves; they insisted, however, upon having them right by their standard. When they did not come right by that standard, they were rejected; but they have never experienced any difficulty in procuring taps and dies that would make interchangeable work. And this brought Mr. Sellers to suggest that as the manufacturers of taps and dies have grown up in the country when the demand for their work was sufficient, so at this time the making of gauges is established—only very recently—perhaps within a year or two. It is a very difficult thing to make a gauge that will be right; in fact, it is impossible to make one that will be so nearly right that no error can be detected in it. But there are practical limits within which it is possible to work commercially, and within which interchangeable work can be attained; and if gauges can be made with this degree of accuracy, they would answer the purpose, so that practically their differences would amount to nothing. The parties interested in this matter ought to make it to the interest of the gauge manufacturer to produce a set of standard measures which all could accept as such, because the trouble does not appear to lie with the system of screw threads. No difficulty seems to exist there. The diffi-

culty is the original one of what is an inch, and until that has been settled it is worth while to discuss the forms of threads—whether they shall have flat tops and flat bottoms, or round tops and round bottoms. The difficulty would exist, and they would not be interchangeable unless an agreement could be reached as to what should be the standard, and what variation from that standard should be permissible.

Early in their endeavor to establish a system of standard threads that would interchange, Messrs. Sellers & Co. were frequently asked to make taps of a larger size than the standard, the complaint being that so much of the iron was cut away as to destroy the value of the bolt. Now, that was perfectly true. If a half-inch and a thirty-quarters and a thirty-second for a three-quarter inch bolt, and then cut to the standard size, a thirty-second of an inch will certainly be cut away unnecessarily for the purpose of making a screw thread. The difficulty exists because almost all iron is rolled to full size. They had the same difficulty in establishing standards for shafting many years ago. They found that one-sixteenth of an inch was sufficient to turn to their standards—that is to say, if the iron was 2 inches and no more, they could make good work. If it was less than 2 inches they had difficulty. They required, therefore, that the mills making their orders should make the iron measure what it purported to be, and for a time had difficulty in obtaining it. After a time, however, that difficulty disappeared, and there is little doubt that there will be no difficulty in getting bolt iron to standard sizes if the public who use it insist upon it.

It is scarcely worth while to have a difference of one thirty-second of an inch or five-eighths, or three-quarters; in fact, it would be a positive nuisance to have such various sizes, because to assort them they must be measured. The difference between a three-quarter and a five-eighth inch bolt is evident at sight, and the sizes ought to vary enough to be detectable by the eye. The only excuse for such minute variations that can be offered is that the iron, as it now comes from the mills, is almost always over size, and can be remedied whenever it is really desired that it be corrected.

Mr. Sellers believed that all the bolts and nuts used by car builders would be interchangeable if the taps were measured by taking the outside diameter, the diameter at the root of the teeth, the angle of the thread and the pitch. He did not think that the matter would be much helped by having a gauge to screw the work into, and argued that if it is soft it will wear out very rapidly; and if it is hardened, the chances will be that it will not be right. Mr. Stetson, superintendent of the Morse Twist Drill Co., and Mr. Grant, representing Messrs. Pratt & Whitney, did not appear to agree with him on the latter point, Mr. Grant stating that hardened steel gauges could be made by processes recently perfected which gave both a true angle of the thread and a correct pitch, adding, however, that they were expensive, although not so much so that they could not be used in all railroad shops.

GLASS ITEMS.

Nearly every table ware factory in Pittsburgh is preparing new styles of ware for the spring trade.

The lamp chimney trade is in good condition, the factories being well employed and sales good.

The *Pottery and Glassware Reporter* says: Work on the new gas furnace at McKee & Bro.'s factory, Southside, Pittsburgh, is progressing very rapidly. Mr. Nicholson promises to have fire in it within a few weeks. In the meantime the old furnaces are doing extraordinary work. The latest great feat in glass making is the getting of 84 pots of glass in one week from the two furnaces of ten pots each. The best week's work ever done when the three furnaces were in operation was the melting of 75 pots. Great improvements have been introduced in the mold shop, by adding a drill press, a lathe and a planer.

The glass works of A. T. Servin at Lenox Furnace (the old Lenox Plate Glass Works, Mass.) have again started up on rough plate, after a suspension of two years or more.

The glass factory of Messrs. R. C. Schmertz & Co., at Belle Vernon, Pa., is in active operation, making about 275 boxes of glass daily. The firm gives employment to 335 skilled workmen.

The property of the Cape Cod Glass Factory, at Sandwich, Mass., was recently sold at sheriff's sale for \$725, to C. C. P. Waterman, the former clerk and paymaster. It has been in operation since 1867.

Gillinder & Sons, manufacturers of glass table ware, lamps and lamp chimneys, have the largest glass factory in Philadelphia. They have 400 hands in their employ, and are very busy.

It is singular, but nevertheless a fact, that foreign manufacturers control nearly the entire American trade in argand chimneys. The only concern in Pittsburgh now making chimneys of this description is the Fort Pitt.

R. C. Schmertz & Co. will operate window glass works at Columbus, Ohio, which have been idle for six years past. This firm now have 26 pots at Belle Vernon, 10 pots at Brownsville and will have 10 at Columbus, making 46 pots in operation.

The Eagle Glass Works at Renta, Iowa, which were erected in 1829, have a building, 55x104, in which is a large 7-foot furnace 18 feet in diameter. They have five shops, three of which are blow shops and two press shops. They employ 60 hands, and work some overtime. Their location is on the Oskaloosa branch of the Chicago, Rock Island and Pacific Railroad. The sand used is from their own county and from Pacific, Mo. Forty miles west is a rich coal field, from which they procure coal and coke.

Mr. Charles M. DuPuy has just received, through Dr. Knight, the bronze medal awarded him for his exhibit at the Paris Exposition. This exhibit consisted of iron and steel in various shapes, made direct from the ore. It attracted much attention from the novel and simple method of using ores to secure the result shown.

sacrifice of 40 or even 50 per cent of the metal by oxidation. This waste is reduced to a minimum by dropping the metallic sponge produced by the direct process into the bath of the open-hearth furnace, where it is protected at once from further action by the oxygen of the furnace gases. The material made by this direct process, while it contains mechanical impurities greater than those in charcoal blooms, is chemically, so far as the metallic iron it contains is concerned, as suitable for the manufacture of high grades of steel as the blooms themselves. The cost of making it is only a fraction of the price of the material used hitherto; in fact, the probabilities are that it is hardly, if any, greater than that of pig made from the same ores. The exact figures cannot at this time be ascertained, because only one furnace is working at Tyrone, so that expense for fuel, labor, &c., is higher than it would be in current working on a larger scale. It should be noted, also, that the quantity of mechanical impurities in raw material of this class, used for the open-hearth process, does not in any way affect injuriously the quality of the metal, the impurities being carried away in the cinder produced in the open-hearth furnace. A second method of procuring for the open-hearth furnace a raw material of sufficient purity from ordinary grades of pig metal is the Krupp washing process, a full and elaborate account of which, both as regards its technical and commercial features, was given some time since by Mr. A. L. Holley, and published in full in *The Iron Age*. The Krupp process cannot by any means be considered an experiment, as more than 17,000 tons of steel have been produced by it at Essen. A Krupp washing plant is now being erected at the Cambria Works, Johnstown, at Springfield, Ill., and at the works of Messrs. Spang, Chalfant & Co., Pittsburgh, and others are in contemplation. At the Cambria Works experiments with a Pernot plant have thus far given ample encouragement. To a certain extent the manufacture is still in the experimental stage, if that term is accepted as applicable to a period in which the results obtained, though frequently fully satisfactory, do not, taking the average of long periods, fairly reach the best obtainable. At the Cambria Works we hear it is not an uncommon thing to turn out three 12-ton charges in 24 hours, starting with cold materials, a result which is fully equal to that reached abroad. The main trouble, it is said, lies with the refractory materials, made by the works themselves. While thus vigorous and well-planned efforts are made in this country, we believe that there is still much room for improvement, and we trust that American enterprise, ingenuity and originality will correctly seize the spirit of the times, and push American metallurgical methods to that advanced position which it has already held in various important departments. We may add, in this connection, that a process which in former years attracted a good deal of well-merited attention, the Henderson process, is worthy of careful attention at the hands of metallurgists and ironmasters, and that if we are correctly informed it has recently obtained the recognition for which it has been struggling so long.

British Exports of Iron, Steel and Metals.

The Board of Trade returns of the exports and imports of iron and steel for Great Britain, covering the year 1879, have just come to hand, and, as they show accurately how much material has been furnished by England to this country during the four months which have passed since the revival in the iron trade, they are valuable in correcting many erroneous statements and exaggerated estimates. The following are the amounts of iron, steel and metals shipped from English ports to the United States during the years 1877, 1878 and 1879:

	1877.	1878.	1879.
Tons.	Tons.	Tons.	Tons.
Pig iron.....	35,953	32,663	27,098
Bar, angle, bolt and rod iron, Railroad iron of all sorts.....	5,877	4,668	21,630
Hoops, sheets, boiler and armor plates.....	2,525	681	44,998
Tin plates.....	5,079	2,021	10,456
Cast or wrought iron and all other manufactures.....	100,593	108,123	155,793
Old iron for remanufacture.....	2,413	3,194	10,403
Steel, unwrought.....	3,167	1,888	177,642
Iron rails.....	0,263	4,905	9,305
Stoneware.....	333	304	20,820
Lead, all sorts.....	402	23,750	1,347
Copper and manufac't's of.....	378	1,347	2,820
Tin.....	45	2,250	659
Hardware	\$1,407,912	\$1,568,000	\$1,625,879
Machinery and mill work, not steam engines	659,703	843,879	

It will be noticed that there is in almost every item of the list a heavy increase, which is most pronounced with pig iron, railroad iron of all sorts, including iron rails, tin plates and old iron for remanufacture. Considering that in almost every branch of the metal trade, the bulk of the foreign purchases on the part of the United States has been made in England, the table given above probably presents very closely the actual imports of this country. The bulk of the pig iron sent here has been Scotch, the excess over last year's supply being 244,000 tons. It should be noted that this represents a large portion of the gain of British pig iron exports during the year, the figures for 1878 and 1879 having been, respectively, 923,080 and 1,227,624 tons. Adding together the

shipments to Germany and those to Holland, the latter receiving only in transit for the former country, we find that the amounts were 460,403 tons for 1878 and 467,936 for 1879. To both countries large shipments were sent in anticipation of the German tariff, and since the latter has gone into effect they have fallen off enormously. In bar, angle, bolt and rod iron, we again note that for the demand from America, export business for British iron markets would have declined somewhat, and a similar state of affairs is to be noticed in the figures for railroad iron, hoops, sheets and plates, and cast or wrought iron manufactures. The striking increase of the demand for tin plates appears, according to the returns, to be confined almost entirely to this country. More than 175,000 tons of English old iron in excess of former years have been absorbed by the United States, in addition to which considerable quantities have also been drawn from other European countries. It is satisfactory to note that the bulk of the supplies obtained is in crude forms, while only the smaller portion comes in the shape of products which go directly into consumers' hands. We would call attention to the fact that the returns nowhere indicate the shipments of any considerable quantity of steel blooms, and that the whole amount of steel rails sent during the year was only 23,750 tons, a quantity ridiculously out of proportion to the huge figures which those interested on both sides of the Atlantic assumed. On the whole, we suppose that the returns will be satisfactory to our English friends. They clearly show the wholesome effect of the American demand, but do not, so far as we are able to gather from the figures for the month of December, exhibit the increase of business with other foreign countries of which so much has been said of late.

Reciprocity with Canada.

The Committee on Commerce of the House of Representatives has now under consideration a bill providing for the appointment of a Board of three Commissioners, to meet three Commissioners to be appointed from the Dominion of Canada, to confer and report, for the information of their respective governments, on the subject of the commercial relations between the two countries. This is a non-committal sort of a measure, but it means a movement in the direction of reciprocity. But were reciprocity as desirable as its advocates consider it, is it by any means certain that the Canadian government would agree to it? There was a time when they wanted it badly enough, and would have made considerable sacrifices to secure it, but since they have resolved upon a policy of protection to home industry, they will, we think, be inclined to test the experiment little further and see what comes of it.

With regard to reciprocity with Canada, there are two things upon which the business men of this country are pretty well agreed. One is that it is desirable in itself considered, and the other is that so long as Canada remains a British colony it is wholly impracticable. The first step in the direction of a commercial union with this country which will be approved by our people, must be the severance of all ties of political union with Great Britain. It may be said that this has been already practically accomplished, and that the colonial relation which Canada bears to Great Britain is only a nominal one. Such, however, is not the fact. So long as the appointment of the Governor General is a prerogative of the British crown, and so long as a vice regal court is maintained at Ottawa, British influence will dominate Canadian politics to a much greater extent than the people of the United States would find agreeable.

This is seen in the new Canadian tariff, which, while presumably impartial and intended for the protection of domestic industry, is really so framed as to favor England at the expense of the United States. This object has been to a great extent secured, for American trade with Canada has been injured out of all proportion to the injury inflicted upon British trade with that country. With Canada as an independent nation, we could afford to negotiate for commercial reciprocity of the freest kind. Her products are largely raw materials, and there is little chance of much industrial development there under existing conditions, or, indeed, under any conditions likely to exist in a country so sparsely settled without a homogeneous population, and for geographical reasons largely dependent upon the railroad system of the United States for an outlet. Canada would be a good market for our manufactures in proportion to her population, and would supply us many classes of products which would cheapen the cost of living in this country without injury to home industry. But as a British colony, with only such rights in the matter of treaties and legislation affecting international interests as the crown may be graciously pleased to permit, the less we have to do with her in the matter of reciprocity the better. After all, Canada and not the United States needs reciprocal trade, and if we grant it, the conditions should be those of our own making, as they undoubtedly will be.

At last we have a ruling of the Supreme Court of the United States on the subject of the liability of employers for injury to workmen. The case before them

was that of a railroad engineer on the Texas and Pacific who lost his life while saving his passengers from accident, the accident being the result of a defect in his engine to which he had called the attention of the master mechanic. His widow sued the railroad, but was ruled out in Texas. The United States Supreme Court held that the employers must not expose their employees to perils which can be guarded against, and if the servant reports defective or unsafe machinery, the master becomes responsible if the repair or restoration is not promptly made. The doctrine, familiar to English courts, but never hitherto adopted here, that the acts of a superior officer or workman under a corporation are as those of the employer, and the latter is responsible for negligence involving disastrous results, was affirmed.

The Science of War.

The "science of war" means something more than it used to, when war was merely the opposing of brute force with brute force. An illustration of what it now implies is furnished by the *Avenir Militaire*, in an account of the apparatus employed in French gunnery practice. The force and velocity of the wind is first measured by an anemometer. Then the weight of the atmosphere must be determined by a barometer, because sights adjusted to a certain barometric pressure must be changed if the pressure varies. Next a hygrometer is used to determine the amount of moisture in the air, as this determines to some extent the resistance encountered by a projectile in its flight. If the object aimed at is out of sight, the use of the plain table or planchette is necessary. Then the gunner must employ the telemeter to measure the distance of the object to be struck, and when all preparations are made he consults the thermometer to see what the temperature is, since allowance must be made for contraction and expansion of the metallic sights. He is then ready to blaze away, but how many instruments he needs to determine the course of his projectile and the effect of his shot we do not know. With such refinements in gunnery, we should think it would not much longer be necessary to kill men, although it is probable that some mortality will result from trifling errors in calculation, or because the soldiers shot at will not stand still while the gunner is calculating his aim. All that is desired by the most bloodthirsty enemy is to place as many as possible of the opposing force *hors de combat*; then scientific surgery comes in, and it will soon be that, if enough pieces can be collected, the worst wounded men can be put together and patched up so as to be almost as good as new in a few months. It is at least satisfactory to know that the greater the progress in scientific warfare and in the improvement of arms, the fewer are killed and wounded in battle. In the days when opposing forces used to stand at arm's length and hack each other to pieces with short swords and axes, very little was known about the science of war; but more men were often killed in a day than could now be brought into the field by any but a first-class military power. Perhaps it will come some day that, instead of making war, the powers at variance will merely send each other a statement of their military preparations, whereat the weaker power will make the necessary concessions.

The Commercial Statistics of France.

Consular advices received at Washington from Mr. Fairchild, U. S. Consul General at Paris, give us some very interesting, and in some respects surprising, statistics of French trade. In 1878 the foreign commerce of France amounted to \$1,840,111,063.40, an increase of \$2,000,000 over 1877. The imports from the United States were \$10,176,000, nearly double the amount of the previous year. In imports the United States stands second among the nations trading with France, Great Britain being the first. In exports the United States is fifth, the amount in 1878 being \$61,240,000; in 1877, \$63,680,000, and in 1873, \$76,660,000. The exports from France to the United States are steadily decreasing, while imports from the United States rapidly increase. In shipping the figures are not so flattering. Of the 1210 vessels sailing to the United States from France, only 176 bore our flag. Trade in corn is ruined by bad packing. The estimated wine product for 1879 is given at 670,000,000 gallons, a decrease of over 400,000,000 gallons from the product of 1878. The production of silk in 1878 was 30 per cent less than in 1877, yet the trade generally was good. The savings banks of France made a remarkable showing. The number of depositors in 1870, previous to the war, was 2,130,768; in 1872 it fell to 2,016,550; in 1877 it rose to 2,864,283; in 1878 the deposits were \$132,000,000; in 1875, \$203,000,000. In 1870, 58 persons in 1000 were depositors, while in 1878 there were 78 persons to the thousand. The national debt of France amounts to about \$4,000,000,000, nearly double that of the United States. More than half of the debt of France bears but three per cent interest. The President's salary is \$120,000, with the same amount for expenses. The civil pensions are \$12,000,000 and military 14,000,000. The cost of the army, about 1,000,000 men, is \$12,000,000 per annum. The average of letters posted by each person in France is 15; in Italy, Spain and Portugal, only 4; in Switzerland it is 20, the latter

being the largest figure shown in European postal statistics. The French are a very great people. Even their characteristic vices become virtues when regarded from an economic standpoint, and the pettiness of their views on many subjects, which shapes their habits in so many ways, appears in statistics as the fruits of a thrif and frugality of which the people of this country know very little. When we consider the almost microscopic economy of French industries and domestic life among the poorer classes, we need no surprise at the wonderful recuperative energy which has so soon obliterated all traces of the war which devastated the country only a few years ago, and sealed what then seemed to be national ruin—the downfall of the Napoleonic dynasty.

It appears that the Boilers' Union do not

take kindly to the action of the miners of Western Pennsylvania in attempting to base the scale for mining coal on the price of boiling iron. In the Union column of the *Labor Tribune*, which column is edited at the Union office, we find the following: "Complaints are pouring in from the First District in regard to the action of Secretary Jones of the Miners' Association, in persisting in basing the scale for mining coal on that paid for boiling. Our members feel that it is an injustice to them, inasmuch as it makes the A. A. of I. and S. W. the medium through which the price paid for mining coal shall be regulated. Certainly we have enough to contend with in regulating the prices of our own membership, without being forced, as it were, to fight for the price that shall or shall not be paid members of other organizations working at an entirely different branch of labor. We are requested to make this notice in this issue, with a view to getting Secretary Jones to base the scale for coal mining on the selling price of coal, and thus avert what may prove to be an elephant on his hands." The action of the miners seems cowardly as well as absurd. It is virtually handing their right over to the boilers, and taking the benefit without incurring the loss. It is like the jackal that hangs around and gorges himself after the lions have feasted. There is but one fair basis of a sliding scale, as there is but one fund out of which wages are paid, and this basis and this fund are the same—the selling price of the product. In this case it is the price of coal. This is the basis of the sliding scales that are being adopted in English mines, and so far we have not seen a hint even of basing these scales on anything else.

NEW PUBLICATIONS.

EXPERIMENTS ON THE STRENGTH OF WROUGHT IRON AND OF CHAIN CABLES.

By Commander L. A. Beardslee, U. S. N. Revised and abridged by William Kent. John Wiley & Sons.

We have had occasion repeatedly to refer to the excellent work of the late United States Test Board, prominent among the achievements of which stands Commander Beardslee's "Report on Wrought Iron and Chain Cables," as full an abstract as the exigencies of our space permitted, being printed in recent issues of *The Iron Age*. The original report is a large volume, and as a limited number of copies only were printed, it has not been accessible to many of those deeply interested in the subjects it treats of. By them the present abridgment, edited by Mr. William Kent, whose long familiarity with tests of metals makes him well fitted to undertake the task, will be no doubt received with satisfaction. The subject matter need not be referred to by us at length, as we have been convinced that all who have perused the data given in the columns of *The Iron Age* will be eager to obtain them in a more elaborate and detailed form, especially as the book includes the deductions from the results of the chemical investigations, so ably summarized by Mr. A. L. Holley some time since. The book is well and clearly printed, well bound, and will prove a valuable addition to every metallurgical library.

THE JOURNAL OF THE IRON AND STEEL INSTITUTE.

Nov. 2, 1879.

The second part of the transactions of the Iron and Steel Institute has just been issued. It contains the proceedings and important discussions which took place at the Liverpool meeting. As we have already published a full report of all that appeared to be valuable to Americans, we need not enter upon the subject at this time. We desire chiefly to note that the usual annual compilation, edited by the general secretary, is appended to the volume. We expressed on a former occasion our views in regard to the policy of publishing, in a work such as the "Transactions," a jumble of abstracts from technical journals and the transactions of kindred institutions, and pointed out numerous errors, both of fact and judgment, on the part of the editor in that portion of the journal. His present effort is an improvement upon the former one, as much of the matter has direct reference to the subjects brought up in the meetings, and there are no startling inaccuracies from a metallurgical point of view. The bulk of the pages are, however, again filled with newspaper clippings, which every progressive member of the Institute has read in the leading journals devoted to the iron and allied trades. Such tables as the Board of Trade returns of the exports of iron and steel of Great Britain for the ten months of 1879, are of great momentary interest, but for future reference in volumes like the journal, are altogether out of place.

By the time such a publication is issued, the returns for a later date are already in the hands of every one interested. If the journal is a proper place for such data, why not wait until the year has closed, so that annual statistics, fresh and of permanent value, can be inserted? The collection and publication of accurate statistical information for the iron trade is supposed to be in

good hands since the British Iron Trade Association undertook to furnish it. As Mr. Jeans is secretary of both these important bodies, he ought to be able to draw the line where the province of one ceases and that of the other begins.

Compressed Air in the Hudson River Tunnel.

A reporter of *The Iron Age* yesterday inspected the work in progress in Jersey City, under the superintendence of Col. Haskin, who is earnestly pushing his project for tunneling the Hudson River to New York city. Looking down into the immense brick well or shaft, 65 feet in depth and 30 feet in diameter, the "air lock" was seen, just disappearing at the entrance of the horizontal excavation through which, as now predicted, the railroads terminating in Jersey City will run their cars to New York at no distant day. The sheds covering the site also cover two air compressors—Clayton's and Sargent's—but only the smaller one is running, at a pressure of 10 pounds per square inch in the tunnel. The engineer in charge said the air-lock was working admirably; that without it they could do nothing; there was not the least trouble from the ingress of water. The break in the soil observed a few days ago, was completely remedied by placing over it a false roof of canvas with heavy timbers above. As the substance encountered thus far is "made earth," excepting a layer of about 10 feet of clay, it is expected that much less difficulty will arise from the escape of air when the solid matter composing the river's bed will have been reached. In regard to this, however, engineers are not wholly agreed; but Colonel Haskin is determined to persevere until the question of success or failure is settled beyond a doubt.

The work now immediately in hand consists of attaching circles of boiler plate to the foremost part or facing of the air lock, gradually enlarging the diameter until the full extreme of 30 feet is reached. The brickwork will follow immediately, being sustained by the iron plates (which are $\frac{5}{8}$ in. thick), while the cement hardens. The construction will give employment to three gangs of men, working in eight-hour shifts night and day. This arrangement will continue until the enlarged tunnel allows space for the bricklayers, and then a gang of masons will be put on in addition. In preparation several thousand brick have accumulated, to be passed in through the doors of the air lock on diminutive cars, 1500 at a time. Meanwhile, the soil from the tunnel will be fed in a semi-fluid state into a hopper at the end of a pipe, so that when the nozzle and cock are opened the whole mass will be forced back into the rear by atmospheric pressure. A large air reservoir on the surface, supplied by the engines, will keep the pressure uniform.

From the foregoing it will be seen that the work of excavation has made little actual progress, and as yet can hardly be considered as a demonstration of success. The "tug of war" comes after striking the ooze beneath the river, which is still some 50 feet distant. The official engineer, Mr. Payne, who has not heretofore committed himself to the air-pressure theory, remarks that he "never anticipated that the tunnel would hold the air without some impervious lining."

Mr. J. Lloyd Haigh's Affairs.—A meeting of the creditors of J. Lloyd Haigh was held on Monday at his office, No. 81 John street, Mr. Thomas McElrath presiding. Nearly all the creditors were present or were represented. The meeting was secret. At its conclusion the reporters were referred to Mr. Haigh's attorney for information, but he positively declined to give any. From other sources it was learned that the committee appointed at the last meeting reported that in their opinion the best means of realizing the largest possible amount for the creditors would be to have the assignee sell them the assigned estate, then to organize a joint stock company to continue the business, and that stock be issued to each creditor to an amount equal to his claim. It was the opinion of the committee that if certain contracts of Mr. Haigh now in hand were filled they would probably realize enough to pay the creditors in full. The report

Special Notices.

BLOWING ENGINE
FOR SALE.

Built by I. P. Morris, Towne & Co., 36-inch Steam Cylinder, 84-inch Blowing Cylinder, 6-feet stroke.

Also, an Air Hoist, with 68 feet lift, 36-inch Cylinder.

They have been well taken care of, are in good working order and ready for immediate use. Apply to

POTTSSTOWN IRON CO.,
WILLIAM H. MORRIS, TREAS.,
Pottstown, Pa.

Phosphor-Tin.
Phosphor-Bronze.

A house in Europe, manufacturing Phosphor-Tin, an indispensable article for the making of Phosphor-Bronze, now so much in demand, desires to give an agency to an American house of good standing dealing in metals. Address, with references, P. O. Box 2116, New York.

Wanted.

To exchange cash and some real estate for a stock of hardware.

ROBERT LUCAS,
Fremont, Ohio.

FOR SALE.

One 10-horse train complete, made by A. Garrison & Co., Pittsburgh, consisting of Roughing, Strand and Guide Rolls, with housings, platings, spindles, boxes and crabs. The train is new and has never been used.

Apply to CHOUTEAU, HARRISON & VALLE IRON CO., No. 94½ N. Second St., St. Louis.

To the Hardware Trade.

I beg to announce that I have been appointed Sole Agent by the Renz Hardware Co., Bridgeport, Conn., for the sale of their celebrated Victor Cast Shears and all other goods manufactured by them.

T. G. CONWAY,
90 Chambers St., New York.

FOR SALE.—Valuable Charcoal Furnace Property, Hampshire county, West Virginia, near Fairmont and Ohio R. about 800 acres well wooded, with 1000 ft. of upper quality ore for wheels and Bessemer from. Ironworks on the fair wheel and buildings, engine, &c., complete. Ready for immediate operation. Five months' charcoal on hand. Apply to

TITUS S. EMERY, 528 Walnut St., Phila., Pa.

FOR SALE.

The entire Canadian right of Kenyon's Adjustable Chain Pump Bucket, a superior and substantial article. Can be accurately adjusted to fit the tube, and enlarged to take up the wear, so that the pump can be kept in good working order. United States County and State rights for sale. Address, T. G. CONWAY, 90 Chambers St., New York.

Wanted.

A gentleman of several years' experience on the road in Hardware stores, would like to make an engine, with 10-horse power, to manufacture either to travel or to sell a line in the trade, or for one now hand. Can furnish first class references, both present and others. Address, Box 48, Office of The Iron Age, 83 Reade St., New York.

For Sale.

The Stevens Iron Furnace, located at Drakesville Station, N. J., on the Del. Lackawanna & Western R. R. Easy of access; in good location for coal and iron ore. Will be sold at a reasonable price and easy payments to a good party. For further particulars, address

GEO. H. MOLLER, Sec'y.,
24 Nassau St., New York.

FOR SALE.

to H. P. Locomotive Boiler; 15 and 20 H. P. Horizontal Tandem Boilers; 15 and 20 H. P. Vertical Boilers; 10 x 12 x 12 ft. H. P. Boilers; 10 x 12 ft. H. P. Horizontal Motion Engines; 3 large Steam Pumps; 20 Small Pumps; 10 Sturtevant Fan; 3 Pump Motors; 2 Spindles; Crank Planer; Portable Drill; 41 Bement Cement Car; Wheel Boring, Coring Drill; Chuck Lathe; 22 in. x 20 ft. Sellers Lathe.

A. G. BROOKS & WINEBRENNER,
261 N. Third street, Philadelphia.
See Circulars.

FOR SALE.

One 30-horse Wm. Wright Engine.
One 40-horse Yale Iron Works Engine.
One 40-horse Plein Bro. & Co. Boiler.

WANTED.

One second-hand Capola, about 36 inches diameter outside. Stiles & Parker Press Co., Middletown, Conn.

WANTED.

By a Foundry and Machine Shop, stocked with first-class workmen and good tools, some light articles, both in iron and wood, to manufacture. Prices moderate. Address BOX 204, West Chester, Penn.

Wanted to Purchase,

AN

Iron Ore Mill, with Revolving Table.

Send description and price to

S. B. LOWE,
Chattanooga, Tenn.

Pressure Blower.

A No. 6 Root Blower, of extra strength, steel shafts, used less than four months, for sale at \$600, f. o. b.

FRANK KING,

Van Buren Furnace, Shenandoah Co., Va.

WANTED.—A situation, by a young man in a Hardware Manufacturing Co., has had six years' experience in the Hardware business; has followed the positions of shipping clerk, salesman and traveling salesman; is versed in Saddlery and Carriage Hardware, as well as general Hardware; is connected with a jobbing hardware house at present. Best references given. Address HARDWARE MFG. CO.,

Office of The Iron Age, 83 Reade St., New York.

Trade Report.

Office of THE IRON AGE.
WEDNESDAY EVENING, JANUARY 21, 1880.

The financial markets have presented some interesting features since our last issue. Messrs. Drexel, Morgan & Co., L. Von Hoffman & Co. and W. L. Scott, as a committee of the syndicate which recently bought 250,000 shares of New York Central and Hudson River Railroad stock from Mr. W. H. Vanderbilt, have, jointly with Messrs. J. S. Morgan & Co., of London, given notice that they will receive sealed bids for any part of this stock from Tuesday, January 20, to Thursday, January 22, at 3 o'clock. The bids may be for as small an amount as five shares, and none will be considered below \$131 per share. The terms of payment are \$20 per share on allotment, the balance within four months.

The specific imports for the week aggregate \$181,088, of which \$18,758 was gold and \$162,330 silver. The total since January 1 is \$194,045, consisting of \$326,711 gold and \$167,334 silver. From August 1, 1879, to January 16, 1880, the imports reached \$78,350,260, including \$75,433,630 gold and \$2,916,630 silver. Of this amount, \$45,874,534 has been received from the Continent, \$26,270,884 from Great Britain and \$6,204,842 from West Indies and South America.

In the money market, the ruling rate for call loans has been 5 to 6% with loans as low as 3%.

Government bonds have been strong, with the exception of the sixes of 1880-81, which declined a fraction in the late dealings. Railroad bonds have been strong and active.

The stock market was strong early in the week, but subsequently became feverish and irregular. Louisville and Nashville advanced from 91 to 121, afterward declined to 111½, then advanced to 113, and again declined to 106. Nashville and Chattanooga declined from 95½ to 80, and then advanced to 85½, afterward declining to 82. These fluctuations were occasioned by the purchase of a controlling interest in the Nashville and Chattanooga by the Louisville and Nashville Railroad.

The bank return shows a gain of \$2,217,425 in surplus reserve, which now stands at \$6,039,825, against \$14,412,750 at this time last year, and \$14,173,725 at the corresponding period in 1878. The loans show a gain this week of \$874,800; the species is up \$2,085,100; the legal tenders are increased \$1,816,400; the deposits other than United States are up \$6,736,300, and the circulation is decreased \$2,177,000.

The following is an analysis of the bank totals of this week compared with that of last week:

Jan. 10	Jan. 17	Comparisons
Loans..... \$276,161,100	\$276,959,250	\$7,798
Specie..... 51,471,000	51,359,600	-1,150
Legal tendrs..... 1,907,800	1,914,200	5,400
Tr. reserve..... 65,571,320	69,472,800	3,901,500
Deposits..... 246,993,600	253,731,900	6,736,300
Reserve required..... 61,748,900	61,432,975	-3,275
Surplus..... 3,822,400	3,099,825	-722,575
Circulation..... 23,812,930	21,035,950	-2,777,000

The foreign trade movements at the port of New York since our last issue are shown in the following tables:

IMPORTS.

For the week ended January 17:

1878	1879	1880
Dry goods..... \$1,832,410	\$642,278	\$1,865,633
General inde..... 4,390,337	1,586,204	4,221,003

Total for week..... \$5,212,747

Prev. reported..... 4,977,793

Since Jan. 1..... \$11,222,500

\$6,496,314

\$13,000,375

Included in the imports were items of merchandise valued as follows:

Quantity	Value
Anvils..... 27	\$2,55
Brass goods..... 15	1,410
Bronzes..... 1	183
Chains and anchors..... 78	2,976
Copper..... 43,854	43,854
Cutlery..... 175	3,547
Gas fixtures..... 1	70
Guns..... 15	3,154
Hardware..... 3	97
Iron, hoop, tons..... 488	19,784
Iron, pig, tons..... 3,107	52,170
Iron sheet, tons..... 85	4,371
Iron wire..... 2,707	5,710
Metal goods..... 191	1,763
Iron, other, tons..... 10,066	221,571
Nails..... 29	98
Needles..... 12	6,742
Nickel..... 14	3,418
Old metal..... 2,382	2,382
Platinum..... 1	1,151
Plated ware..... 117	5,615
Potassium caps..... 3	775
Steel..... 6,377	38,976
Silverware..... 5	358
Tin, bxs..... 24,600	131,323
Tin, 5,821 slabs..... 495,032	103,585
Wire..... 1,207	27,932

EXPORTS, EXCLUSIVE OF SPECIE.

For week ended January 17:

1878

1879

1880

For the week..... \$3,005,107

\$4,347,580

\$4,429,573

Prev. reported..... 4,993,152

Since Jan. 1..... \$11,575,711

\$8,676,955

\$10,685,980

EXPORTS OF SPECIE.

For the week ended January 17:

1878

1879

1880

Total for week..... \$257,667

Previously reported..... 4,027,733

Total since January 1, 1880..... \$328,836

Government bonds at the close were strong at the following quotations:

Bid.	Asked.
U. S. 6's 1880 registered..... 103½	103½
U. S. 6's 1880 coupon..... 103½	103½
U. S. 6's 1881 registered..... 101½	101½
U. S. 6's 1881 coupon..... 101½	101½
U. S. 6's 1882 registered..... 101½	101½
U. S. 6's 1882 coupon..... 101½	101½
U. S. 6's 1883 registered..... 101½	101½
U. S. 6's 1883 coupon..... 101½	101½
U. S. 6's 1884 registered..... 101½	101½
U. S. 6's 1884 coupon..... 101½	101½
U. S. 6's 1885 registered..... 101½	101½
U. S. 6's 1885 coupon..... 101½	101½
U. S. 6's 1886 registered..... 101½	101½
U. S. 6's 1886 coupon..... 101½	101½
U. S. 6's 1887 registered..... 101½	101½
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U. S. 6's 1890 coupon..... 101½	101½
U. S. 6's 1891 registered..... 101½	101½
U. S. 6's 1891 coupon..... 101½	101½
U. S. 6's 1892 registered..... 101½	101½
U. S. 6's 1892 coupon..... 101½	101½
U. S. 6's 1893 registered..... 101½	101½
U. S. 6's 1	

Figured Loose Pin Butts, without Acorns, Japanned, No. 67. 45¹⁰
Japanned Parliament Butts, without Acorns, No. 79. 35¹⁰
Japanese Parliament Butts, with Japanese Acorn, No. 79. 35¹⁰
Japanned Parliament Butts, with Silvered Acorn, No. 77. 35¹⁰
Boston Flush Butts, Nos. 38, 39 and 40. 6¹⁰
Terms, cash 30 days. Prices subject to change without notice.

We print below an official account of a meeting of the Clothes Wringer Manufacturers' Association of the United States, held in this city on the 19th inst. It will be seen that the wholesale price list has been advanced \$3 per dozen:

NEW YORK, January 19, 1850.

At a meeting of the manufacturers of Clothes Wringers, held in this city on the above date, at which representatives of all the licensed manufacturers of Wringers were present, viz., the Metropolitan Washing Machine Co., Bailey Wringer Machine Co., Peerless Wringer Co., Empire Wringer Co., Eureka Clothes Wringer Machine Co., Colby Wringer Co., and F. F. Adams & Co., Limited, it was voted to form an association, which was accordingly done under the title of the "Clothes Wringer Manufacturers' Association of the United States." Articles of association were adopted, and the following officers elected for the ensuing year, viz., president, C. M. Howlett, of the Empire Wringer Co.; vice president, R. Simpson, of the Peerless Wringer Co.; treasurer, R. P. Smith, of the Bailey Wringer Machine Co.; secretary (acting), Robert W. Strong; Standing committee, R. C. Browning, of the Metropolitan Washing Machine Co.; Fred. E. Smith, of the Colby Wringer Co.; M. N. Lovell, of F. F. Adams & Co., Limited.

It was voted by the association that for the better protection of its members against infringement of their patents and trade-marks that the various patents and trade-marks of each member (over 100 patents in all), be placed subject to the direction of the standing committee.

The matter of prices being considered and compared with the great advances that have taken place in the past six months in all materials used in the construction of Clothes Wringers, particularly in Iron and Rubber, it was voted that an advance of \$3.00 per dozen be made upon the wholesale price list of last year, which shall remain in force until changed by a meeting of the association, the price list adopted being as follows:

WRINGERS WITHOUT COG WHEELS (FRICTION), WITH HOLLS. Per doz.

100 more than 1 $\frac{1}{2}$ and not over 1 $\frac{1}{4}$ inches. \$57.00
100 " 2 $\frac{1}{2}$ " 1 $\frac{1}{2}$ " 60.00
100 " 2 $\frac{1}{2}$ " 2 " 64.00

WRINGERS WITH COG WHEELS, WITH ROLLS. Per doz.

100 more than 1 $\frac{1}{2}$ and not over 1 $\frac{1}{4}$ inches. \$63.00
100 " 2 $\frac{1}{2}$ " 1 $\frac{1}{2}$ " 68.00
100 " 2 $\frac{1}{2}$ " 2 " 72.00

100 $\frac{1}{2}$ inches or less. 84.00
100 more than 1 $\frac{1}{2}$ and not over 2 inches. 92.00
100 $\frac{1}{2}$ inches or less. 144.00

Wringers with Bench attached, 20 per doz. in advance of the list for Cog Wheel Wringers.

It was also voted that the terms of sale should remain the same as given in last year's price list, and that no deviation from these prices and terms should be made by any member of the association, and in view of the continued advance in prices of materials, that the above list of prices should be subject to change at any meeting of the association without notice to the trade.

ROBERT W. STRONG,
Acting Secretary.

SIMPSON & GAULT have also advanced their "Peerless," "Favorite," "Unique" and "Tip Top" Wringers, as will be seen by the following communication:

OFFICE PEERLESS WRINGER CO.,
79 CHAMBERS STREET,
NEW YORK, Jan. 9, 1850.

In accordance with the action of the Clothes Wringer Association the prices of "Peerless," "Favorite," "Unique" and "Tip Top" Clothes Wringers have been advanced \$3 per dozen from list of February, 1879. Below we quote you prices as agreed upon, subject to change at the call of the association:

PRICE LIST.

Names and Numbers.	Size of Roll.	Price.	Per doz.	
			Length	Diameter
Peerless Wringers, No. 1	10	1 $\frac{1}{2}$	\$54.00	
" 2 $\frac{1}{2}$	10	1 $\frac{1}{2}$	57.00	
No. 2	10	1 $\frac{1}{2}$	63.00	
No. 3	10	1 $\frac{1}{2}$	74.00	
No. 4	12	2	90.00	
No. 5	14	2 $\frac{1}{2}$	144.00	
No. 6	16	2 $\frac{1}{2}$	25.00	Each.
Peerless XXX Wringers, No. 2 $\frac{1}{2}$	10	1 $\frac{1}{2}$	65.00	Per doz.
No. 2	10	1 $\frac{1}{2}$	68.00	
No. 3	11	1 $\frac{1}{2}$	76.00	
No. 4	12	2	96.00	
No. 5	14	2 $\frac{1}{2}$	144.00	
No. 6	16	2 $\frac{1}{2}$	25.00	Per doz.
Favorite Wringers, No. 3 $\frac{1}{2}$	10	2	72.00	
No. 4 $\frac{1}{2}$	11	2	83.00	
No. 5 $\frac{1}{2}$	12	2	98.00	
No. 1	10	1 $\frac{1}{2}$	57.00	
No. 2 $\frac{1}{2}$	10	1 $\frac{1}{2}$	63.00	
No. 3	11	1 $\frac{1}{2}$	74.00	
No. 4	12	2	90.00	
No. 5	14	2 $\frac{1}{2}$	144.00	
No. 6	16	2 $\frac{1}{2}$	25.00	Per doz.
Unique Wringers, No. 1	10	1 $\frac{1}{2}$	54.00	
No. 2	10	1 $\frac{1}{2}$	57.00	

In the future, as in the past, we shall spare no expense or pains to make the "Peerless," "Favorite" and "Unique" the best Wringers in the market. Thankful for past favors and patronage, we would respectfully solicit a continuance of your orders for the future. Yours very truly,

W. H. QUINN, Manager, New York Office.

The Peerless Wringer Co., Simpson & Gault, proprietors, show in their advertisement, which occupies the 24th page, view of their large establishment at Cincinnati, and also illustrate some of their leading styles of Clothes Wringers. We are informed that their works are being urged to their fullest capacity. In addition to their home trade they are shipping largely to Europe, and have recently received some handsome orders for South America.

We understand that the Stanley Works

have recently purchased from Messrs. Crooke & Co., of this city, all the machinery, tools, &c., formerly used by them in the manufacture of Wrought Iron Butts, and have put it in operation, and that by this means they will increase their product of Butts about 50 per cent. They have in use at their works in New Britain, Conn., one of Brush's Electric Light Machines of the largest size (19 lamps), which we are informed gives ample light for three rooms, 200 x 40 feet each, and, after a month's trial, is pronounced by them a perfect success, enabling their workmen to produce goods in quality and quantity fully equal to those made by daylight.

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It was voted by the association that for the better protection of its members against infringement of their patents and trade-marks that the various patents and trade-marks of each member (over 100 patents in all), be placed subject to the direction of the standing committee.

The matter of prices being considered and compared with the great advances that have taken place in the past six months in all materials used in the construction of Clothes Wringers, particularly in Iron and Rubber, it was voted that an advance of \$3.00 per dozen be made upon the wholesale price list of last year, which shall remain in force until changed by a meeting of the association, the price list adopted being as follows:

Dis. per cent.

Narrow, Table, Back Flaps, Inside Blind, Broad, Few Door, Chest. 25¹⁰

Light Inside Blind. 30¹⁰

Reversible Loose Joint. 35¹⁰

Loose Pin Light Narrow. 35¹⁰

Light Narrow. 35¹⁰

Inside Blind Loose Pin. 35¹⁰

It is expected that other manufacturers will adopt these prices.

We have received the following:

Office of the RENZ HARDWARE Co., January 19, 1850.

To the Hardware and Notion Trade.—GENTLEMEN: We desire to call your attention to the fact that we have closed our account with J. G. Witte & Bro., of New York, and have appointed T. G. Conway, No. 100 Chambers street, our sole agent for the sale of the celebrated Victor Cast Shears and other goods of our manufacture, who will at all times sell to the trade at lowest factory prices, and as we are now erecting a foundry for making our own castings, we can meet the market at any time on price and quality. The genuine Victor Cast Shear can only be purchased of T. G. Conway, 90 Chambers street or

THE RENZ HARDWARE Co., Bridgeport, Conn.

John C. Jewett & Sons, Buffalo, N. Y., have issued a revised and illustrated catalogue and price list, under date of January, 1850, in which they show a large assortment of Housefurnishing and miscellaneous Hardware. The book is handsomely printed, and contains 144 pages. In their discount sheet, which we print below, some estimate of the variety of their manufacturers can be formed:

Discounts from List Prices in John C. Jewett & Sons' Catalogue and Price List of January, 1850.

Dis. per cent.

Boston Finish Parliament Butts, Steeple Tips, No. 60.

Boston Finish Parliament Butts, Steeple Tips, No. 61.

Boston Finish Parliament Butts, Steeple Tips, No. 62.

Boston Finish Parliament Butts, Steeple Tips, No. 63.

Boston Finish Parliament Butts, Steeple Tips, No. 64.

Boston Finish Parliament Butts, Steeple Tips, No. 65.

Boston Finish Parliament Butts, Steeple Tips, No. 66.

Boston Finish Parliament Butts, Steeple Tips, No. 67.

Boston Finish Parliament Butts, Steeple Tips, No. 68.

Boston Finish Parliament Butts, Steeple Tips, No. 69.

Boston Finish Parliament Butts, Steeple Tips, No. 70.

Boston Finish Parliament Butts, Steeple Tips, No. 71.

Boston Finish Parliament Butts, Steeple Tips, No. 72.

Boston Finish Parliament Butts, Steeple Tips, No. 73.

Boston Finish Parliament Butts, Steeple Tips, No. 74.

Boston Finish Parliament Butts, Steeple Tips, No. 75.

Boston Finish Parliament Butts, Steeple Tips, No. 76.

Boston Finish Parliament Butts, Steeple Tips, No. 77.

Boston Finish Parliament Butts, Steeple Tips, No. 78.

Boston Finish Parliament Butts, Steeple Tips, No. 79.

Boston Finish Parliament Butts, Steeple Tips, No. 80.

Boston Finish Parliament Butts, Steeple Tips, No. 81.

Boston Finish Parliament Butts, Steeple Tips, No. 82.

Boston Finish Parliament Butts, Steeple Tips, No. 83.

Boston Finish Parliament Butts, Steeple Tips, No. 84.

Boston Finish Parliament Butts, Steeple Tips, No. 85.

Boston Finish Parliament Butts, Steeple Tips, No. 86.

Boston Finish Parliament Butts, Steeple Tips, No. 87.

Boston Finish Parliament Butts, Steeple Tips, No. 88.

Boston Finish Parliament Butts, Steeple Tips, No. 89.

Boston Finish Parliament Butts, Steeple Tips, No. 90.

Boston Finish Parliament Butts, Steeple Tips, No. 91.

Boston Finish Parliament Butts, Steeple Tips, No. 92.

Boston Finish Parliament Butts, Steeple Tips, No. 93.

Boston Finish Parliament Butts, Steeple Tips, No. 94.

Boston Finish Parliament Butts, Steeple Tips, No. 95.

Boston Finish Parliament Butts, Steeple Tips, No. 96.

Boston Finish Parliament Butts, Steeple Tips, No. 97.

Boston Finish Parliament Butts, Steeple Tips, No. 98.

Boston Finish Parliament Butts, Steeple Tips, No. 99.

Boston Finish Parliament Butts, Steeple Tips, No. 100.

Boston Finish Parliament Butts, Steeple Tips, No. 101.

Boston Finish Parliament Butts

Nos. 5140 5142 5145 5147 5150 5152
Inch. 1/4 1/2 1/4 2 1/2 3
Per Gross \$4.35 4.75 5.00 5.30 6.00 7.70

169. Hooks, Lamp, Brass. 10

170, 171. Sliding Door Stops, Sheaves and Rail. 15

172-173. Pulleys, Frame, change list. 25

Nos. 11 12 13 14, 1/2 in. 112 113
\$0.55 .62 .75 1.40 .50 .70 .85

279-286. Pulleys, Axle, add. 25

Nos. 57 60 175 176
Inch. 1/4 2 1/2 2 1/2
\$0.54 .63 1.60 1.72

Change list. 25

Nos. 15 16 200 210 177
\$0.55 .62 .75 1.40 2.20

187. Pulleys, Dumb Waiter. 15

188. " Iron Screw, Japanned. net

189. " Brass Screw, change list. 20

Nos. 7000 7005 7010 7015
\$1.38 1.50 1.80 2.20

189. 190. Pulleys, Iron Screw, Incased, upright, Curtain and Side. net

191. Pulleys, Awning. 10-1/2

Add 1/2 in., No. 55, single. No. 56, Double. 10

\$2.40 3.30

192. Pulleys, Clothes Line. 10-1/2

Add Nos. 61, 2 1/2 in. 62, 3 in., galvanized. 25

\$2.25 .75 .45

192, 193. Pulleys, Clothes Line. 10-1/2

Add Nos. 62, 3 in., Japanned. 25

\$1.95 .75

194. Pulleys, Hot-house. 15

195. Sash Rollers, change list. net

Nos. 20 25 30 33 36 40

\$0.15 .20 .30 .35 .40 .45

196. Sash Cord Irons, Frops and Sholl's Patent. net

197, 199. " Fasteners, change list. net

Nos. 23 24 25 26 27 28 add .42

\$0.63 .68 .72 .75 .70 .80 .20

200-203. Sash Fasteners, change list. net

Nos. 720 725 717 716 727 add 726 725 727

\$1.20 1.15 1.15 0.75 0.65 .50

204, 205. Sash Fasteners, Brass and Bronze Metal. net

206. Shutter or Sash Knobs, change list. 25

Nos. 25 26 27 28 add Nos. 28, 26 in. 1900, 194 in.

\$1.25 1.50 .80 .20

207. Sash Lifts, A. D. Bronzed add No. 302. 15

Extra Polished \$1.50. 15

208, 209. Sash Lifts, add. 10

No. 314, A. D. Brz. 315 314, Brz. Metal. 135

\$0.55 .55 .55 .55

209. Flush Rings, Brass. 10-1/2

210-212. Shutter Bars, A. D. Bronzed, chang. list. 10

Nos. 567 568 569

\$0.93 .95 1.05

212. Shutter Bars, Brass. net

" " Bro. Metal, add No. 1567/2, 2

in. \$4.00; change list. 25

Nos. 1550 1555 1558

\$3.25 3.50 3.50

214. Ox Balla, Brass, change list. net

Nos. 2000 2004 2008 2010 2012

\$4.30 7.80 10.20 5.40 6.00 .60

Nos. 2013 2014 2015 2016 2017 2018 2020

\$6.60 7.20 7.05 7.83 8.40 10.80 15.00

215. Sash Centers or Transom Plates. 10-1/2

216, 217. Stubbs and Plate, Shut Srs. and Lfts. 10

218. Plate Casters, all Iron, change list. 15

Nos. 1 2 3 4 5 6 7

\$0.09 .10 .11 .14 .15 .19 .26

219. Plate Casters, Porcelain Wheel. 15

220. Plate Casters, Lig. Vitre Wheel, chang. list. 15

Nos. 1 2 3 4 5 6 7

\$0.10 .14 .15 .18 .20 .24 .30

221. Plate Casters, Brass Wheel, change list, No. 15

3.40; 32; No. 4, \$0.41

Bed Casters—New List.

219. All Iron. 15

Nos. 1/2-0 1/2-1 1/2-2 2-0 2-1 2-2 2-3

Per set.11 .13 .15 .17 .20 .22

219. Wood Wheel. 15

Nos. 1/2-0 1/2-1 1/2-2 2-0 2-1 2-2 2-3

Per set.15 .16 .18 .20 .22 .24 .35

219. Lignum Vitre Wheel. 15

Nos. 1/2-0 1/2-1 1/2-2 2-0 2-1 2-2 2-3

Per set.15 .16 .18 .20 .22 .24 .35

219. Bed Casters, Globe Wheel. 15

French Casters—New List.

219. Iron Horn, Iron Wheel. 15

Nos. 2 3 4 5

Per set.15 .16 .18 .20 .22 .24

219. Iron Horn, Porcelain Wheel. 15

Nos. 2 3 4 5

Per set.15 .16 .18 .20 .22 .24

219. Iron Horn, Brass Wheel. 15

Nos. 2 3 4 5

Per set.15 .16 .18 .20 .22 .24

219. Brass Horn, Porcelain Wheel. 15

Nos. 2 3 4 5

Per set.15 .16 .18 .20 .22 .24

219. Brass Horn, Lignum Vitre Wheel. 15

Nos. 2 3 4 5

Per set.15 .16 .18 .20 .22 .24

219. Brass Horn, Lignum Vitre Wheel. 15

Nos. 2 3 4 5

Per set.15 .16 .18 .20 .22 .24

219. House Belts, Double Stroke. 25

220. House Belts, on Carriage. 10-1/2

220. House Belts, Bell Metal, change list. net

Rough. B. I. ght. Polished.40

221. Casters, Store Truck. 25

222. Wheel for Store Trucks. 25

223. Brackets, Window Shade, change list, No. 15

224. Rollers, Ends, add No. 4, \$4.75, without

Thimbles, change list, No. 5, \$5. 33/2

224, 225. Racks, Window Shade. 30

226, 227. Bed Folds, change list. net

Nos. 3 4 5 6 7 8 9

\$0.05 .06 .07 .08 .09 .10 .11

Nos. 5 10 15 20 .25 .30

\$0.05 .06 .07 .08 .09 .10 .11

228. Gongs Belts, Double Stroke. 25

229. House Belts, on Carriage. 10-1/2

229. House Belts, Bell Metal, change list. net

Rough. B. I. ght. Polished.40

230, 231. Bell Cranks, Check Springs and Bell. 15

Spikes, change list. net

Nos. 10 20 30 40 50 60 70

\$4.00 5.75 7.15 9.75 12.25 20.35 28.85

Nos. 15 25 35 45 55 65 75

\$3.75 4.00 4.00 4.00 4.00 5.00 6.00

232. Bell Pulls, Slide, change list. net

Nos. 4915 4975

\$5.75 10.50

233-235. Stationary Goods, change list. 10

Nos. 48 49 48

\$4.80 1.15

236. Hinges, In Ilo Shutter. 15

237. Butt, Loose Pin, Japanned, No. 18, without

Screws, style and list as No. 20. 45

238. Butt, Loose Pin, Japanned, No. 20, packed

with Screws. 40

239. Butt, Loose Joint, Japa. ned. No. 25, packed

EXPORTS

Of Hardware, Iron, Machinery, Metals, &c., from the Port of New York, for the Week ending January 20, 1880:

Arendal.	Havre.
Quan. Val.	Quan. Val.
Palm., gals. 75,500 \$5.50	Ag. imp., pgs. 734 \$6,400
Hamburg.	Marseilles.
Palm., gals. 17,130	Palm., gals. 176,178 \$3.35
Boiling, pgs. 17 2,733	Hdw., cs. 552 9.76
Mach'y. pgs. 53 17,130	Glassware, cs. 2 13
Hdw., pgs. 2,244	Mt. Iron, pgs. 6 459
Lub. oil, bbls. 186 2,268	Oil stoves, cs. 61 406
Glassware, pgs. 8 225	Rifles, cs. 3 560
Speeler, slabs 2749 9,285	Sev. mach., cs. 15 500
Wringers, cs. 8 192	Sheaf, oil flask 250 15
Ag. imp., pgs. 11 350	Brass g'ds, cs. 37 379
Sev. mach., cs. 303 3,988	Lea. belt, es. 2 1,000
Weld., cs. 500	RR. cars. 7 3,750
Dutch East Indies.	Mach'y. cs. 100 2,000
Plm., gls. 2,067,150 247,155	Pumps, pgs. 4 113
Antwerp.	Palm., gls. 8,105,534 31,000
Plm., gls. 683,793 50,703	Hdw., cs. 23 1,370
Lub. oil, bbls. 5,120 14,848	Ag. imp., pgs. 54 3,374
Bristol.	Lea. belt, es. 2 1,000
Palm., gals. 275,177 19,257	RR. cars. 7 3,750
Hull.	Mach'y. cs. 100 2,000
Porto Rico.	Pumps, pgs. 4 113
Wtr. pipes, pgs. 50 600	Hdw., cs. 23 1,370
Hdw., cs. 1 22	Ag. imp., pgs. 54 3,374
Pumps, pgs. 23 1,370	Lea. belt, es. 2 1,000
Mf. iron, pgs. 3 60	RR. cars. 7 3,750
Liverpool.	Mach'y. cs. 100 2,000
Platedw're, cs. 3 196	Pumps, pgs. 4 113
Mach'y. pgs. 54 7,315	Hdw., cs. 23 1,370
Lub. oil, bbls. 205 3,524	Scale, pgs. 35 300
Scale, cs. 56 56	Glassware, cs. 17 915
Cutterly, cs. 1 100	Grindstones, cs. 40 100
Metal g'ds, cs. 7 1,040	Mach'y. pgs. 136 2,937
Palm., gals. 269,093 22,250	Pite glass, pgs. 4 100
Hdw., pgs. 72 4,100	Common Sheet, No. 55 to 25 64¢
Sew. mach. 210 2,400	Common Sheet, No. 22 to 25 64¢
Rifles, cs. 60 11,700	Common Sheet, No. 16 to 21 64¢
Telephones, pgs. 58 5,100	Best Refined 1/2¢ advance on the above.
Mf. iron, pgs. 8 75	Best Bloom, pgs. 10 to 25 8¢
Ag. imp., pgs. 8 17,083	Best Bloom, pgs. 10 to 25 8¢
Glassware, bbls. 14 335	Best Bloom, pgs. 10 to 25 8¢
Hdw., pgs. 134 1,270	Common Red Plates, 1/2¢ to 16 7¢
British North Amer.	Blue Annulated, 1/2¢ to 16 7¢
ican Colonies.	Second Bloom, Galvanized, discount. 10¢
Mexico.	Second quality, discount. 20¢
Palm., gals. 700 131	Glasgow.
Coal, tons. 583 2,710	Mach'y. pgs. 20 388
R.R. cars. 8 4,000	Cards, g'ds, cs. 60 993
United States of Co-	Common, g'ds, cs. 60 993
lombia.	Mach'y. pgs. 20 388
Cars. 2 1,365	Common, g'ds, cs. 60 993
British Guiana.	Common, g'ds, cs. 60 993
Hdw., pgs. 17 255	Common, g'ds, cs. 60 993
Glassware, cs. 22 293	Palm., gals. 102 131
Car. mta., pgs. 41 137	Palm., gals. 102 131
Venezuela.	Bullets, kgs. 20 142
Hdw., cs. 26 333	Powder, lbs. 63 137
Nails, kgs. 3 31	
Palm., gals. 1887 250	
Yarn, g'ds, cs. 5 540	
Nails, bxs. 6 65	
Mf. iron, pgs. 5 53	
Palm., gals. 10,093 1,255	
Glassware, cs. 20 997	
Palm., gals. 178 14	Pumps, pgs. 3 130
Brazil.	
Hdw., pgs. 14 280	
Nails, kgs. 3 31	
Palm., gals. 1887 250	
Sev. mach., cs. 4 40	
Wire boxes. 15 70	
British Possessions in Africa.	
Palm., gals. 173,300 21,725	
Sev. mach., cs. 125 2,000	
Mf. iron, pgs. 93 3,115	
Ag. imp., pgs. 123 2,000	
Palm., gals. 1887 250	
Sev. mach., cs. 4 40	
Wire g'ds, cs. 15 70	
Hdw., cs. 81 1,265	
Nails, kgs. 4 65	
Glassware, cs. 6 125	
Fire arms, cs. 1 100	
PHILADELPHIA.	
Office of The Iron Age, 220 South Fourth St., Philadelphia, Jan. 20, 1880.	
Pig Iron.—We have again to note a further advance in prices, amounting on an average during the week to about \$2 per ton. The market is less active, however, and for the time being it seems as though the advancing tendency is likely to be checked. Buyers in this vicinity have pretty generally supplied their immediate wants, and unless the speculative feeling breaks out again, a steady market at uniform prices may be looked for. Much will depend, however, upon the character of the demand from the West; if consumers in that section find it necessary to repeat purchases here, a further advance is inevitable. Stocks at furnaces are entirely exhausted, and the companies have sold so largely for future delivery that they are perfectly informed about new business. The general condition of the market, therefore, may be considered very strong, and while, as before stated, the market at the moment is something quieter than it has been, there is nothing in sight likely to depress prices, but on the contrary, a very slight movement might lead to a further advance. The prevailing opinion seems to be that high prices will continue during the current year, and that present quotations are perfectly safe.	
Scrap Iron.—Firm and higher. Wrought sold at \$40 @ \$42; Cast, \$30 @ \$32.	
Nails.—We have to note a further advance to \$5.25, and, with light stocks, holders are very firm.	
PITTSBURGH.	
Office of The Iron Age, 77 Fourth Avenue, Pittsburgh, Pa., Jan. 20, 1880.	
The principal local event the past week was the strike by the coal miners, the effect of which has been serious to all large consumers, as the price has gone up fully \$2 per bushel. In addition to the enhanced cost, there is an actual scarcity, and some of our mills have been obliged to curtail operations in consequence. These coal miners appear to have an innate propensity for striking; as soon as they get a little money ahead they are ready for a strike, and while occasionally they gain their point, they are always the greatest sufferers in the end. Some of the operators whose mines are located along the railroads, and who have contracts here and elsewhere, have succumbed, but most of the river operators are still holding out and refuse to pay the advance. These strikes have a bad effect upon general business, as coal is a very important factor in the production of all our leading manufactures, and an advance of 2¢ @ 3¢ per bushel counts up, especially with those of our manufacturers who are sold ahead, and cannot charge it up to the buyer	
Muck Bars.—The market has been rather quiet, but holders are generally firm at \$60. Some sales have been made at slightly lower figures, but \$60 may now be regarded as a fair quotation.	
Structural Iron.—The demand cannot be called active, although there is a fair business doing, with more in prospect. The rapid advance in prices seems to have checked the demand in some quarters, but manufacturers are quite easy, having fair orders on their books, with inquiries promising a steady addition from time to time. It is thought that a large amount of work will be given out during the spring months, and prices are steadily maintained. Angles quoted \$3.50 @ 4¢; Beams, Channels, and Tees, 4.5¢.	
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Sheet Iron.—This branch of the iron trade is very busy, and manufacturers have declined many orders during the past week. Stocks with them are light, and as they have already an average of nearly three months' work on hand, they are for the present indifferent about any additional orders. There is a general anticipation of higher prices towards spring, hence the urgency to place orders now. The following are to-day about current rates for small lots, but prices are subject to change at any moment:	
Common Sheet, No. 55 to 25 64¢	
Common Sheet, No. 22 to 25 64¢	
Common Sheet, No. 16 to 21 64¢	
Best Refined 1/2¢ advance on the above.	
Best Bloom, pgs. 10 to 25 8¢	
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Common Red Plates, 1/2¢ to 16 7¢	
Blue Annulated, 1/2¢ to 16 7¢	
Second Bloom, Galvanized, discount. 10¢	
Second quality, discount. 20¢	
Baird Iron.—The market is unsettled, but prices keep on advancing, without the slightest indication of a reaction. Buyers are at hand for all the Iron that is offered, and manufacturers have declined many desirable orders for future months unless subject to price at time of delivery. Some have placed orders on these terms, which is evidence that there is an apprehension of actual scarcity. Stocks in first hands are unusually light, while the requirements of others are such that they are compelled to carry more than usual. The price of iron is nominally 3.6¢, but 3.75¢ may be regarded as nearer the actual selling price, while many decline to enter orders for next month at less than 4¢. Skip Iron is in active demand, and has been sold during the week at 4¢ for grooved, and 4.5¢ for sheared. Market for all kinds active and upward.	
Nails.—The market is rather quiet, the recent sharp advance having, as it was expected it would, checked the demand; however, this is ordinarily a dull month in the Nail trade, and it is probable orders will commence to come forward pretty freely early next month. We now quote at \$5.60 per ton, 2¢ off for cash, and the usual abatement of 10¢ per kg on lots of 200 kgs and upward.	
Steel Balls.—The market is unchanged, but prices are very firm at \$80 @ \$85 at mill. We cannot hear of any orders having been placed during the week, as manufacturers prefer running off what they have on hand rather than to enter into new engagements. English rails could be laid down to-day at about \$80, but we have no information as to recent transactions.	
Wrought Iron Pipe.—There is more inquiry than usual at this season of the year, which is owing to an apprehension on the part of buyers that a further advance soon is not improbable. We continue to quote at 25¢ off, but it is doubtful whether a large order could be placed at the rate in question. Boiler Tubes unchanged at 5 and 5% days, 2% off for cash, and the usual abatement of 10¢ per kg on lots of 200 kgs and upward.	
Ores.—The demand for Ores is now in excess of anything ever known in the district. But a "corner" is not possible, because the supply is only limited by the supply and price of labor. Ores are in such plentiful amounts, they lie so conveniently for mining and are so cheap in the mines, that but small capital and skill are required to bring them to market at a fair profit at reasonably low rates. We continue quotations: Brown Hematite, 50% @ 5¢ per ton, at \$4 @ \$3.50; inferior do., \$17 @ \$2.4¢; Cast Scrap, \$20 @ \$2.5¢; inferior do., \$15 @ \$2.0¢. We quote Old Car Wheels at \$30 @ \$35, according to make.	
Muck Bar, &c.—The market is still bare of Muck Bar and Old Rails. We continue rates as before on other miscellaneous articles. We quote Wrought Scrap at \$28 @ \$35; inferior do., \$17 @ \$2.4¢; Cast Scrap, \$20 @ \$2.5¢; inferior do., \$15 @ \$2.0¢. We quote Old Car Wheels at \$30 @ \$35, according to make.	
Rails.—The demand for Ores is now in excess of anything ever known in the district. But a "corner" is not possible, because the supply is only limited by the supply and price of labor. Ores are in such plentiful amounts, they lie so conveniently for mining and are so cheap in the mines, that but small capital and skill are required to bring them to market at a fair profit at reasonably low rates. We continue quotations: Brown Hematite, 50% @ 5¢ per ton, at \$4 @ \$3.50; inferior do., \$17 @ \$2.4¢; Cast Scrap, \$20 @ \$2.5¢; inferior do., \$15 @ \$2.0¢. We quote Old Car Wheels at \$30 @ \$35, according to make.	
Steel Balls.—For which there is a continued brisk demand, have further advanced, and we now quote at 4.5¢ per lb, 30 days. All kinds of railway supplies are going up, owing to the enhanced cost of Iron, and it is probable the sharp advance in the former will curtail the consumption.	
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Nails.—The advance in Nails at Wheeling and Pittsburgh has had no effect here, except to put the price 5¢ higher than the association card. The trade continues, as before, very brisk, mills selecting their orders, and not making contracts for future delivery at any fixed price. We quote at \$5.25 rates.	
Steel Bars.—The market is firm, and prices are still tending upward. Sales have been made at \$65, at mill, but manufacturers would hesitate before taking anything now for less than \$70. The mills are pretty full of work, and there is no disposition in regard to the immediate future. We quote market firm at \$67.50 @ \$70, at mill.	
Old Rails.—The market has been quite active during the week, and, as a rule, has shown a steadily-advancing tendency. The demand has been more active during the past day or two, and prices are from \$1 to \$2 per ton higher than they were on Saturday. Holders are firmer in their views, and \$44 @ \$45 is asked, spot and to arrive, with several transactions reported at extreme figures. Sales have been made at \$42 @ \$43, but we hear of nothing offered to-day, unless at the advance above named, at which figures several lots have been closed.	
Scrap Iron.—Firm and higher. Wrought sold at \$40 @ \$42; Cast, \$30 @ \$32.	
Nails.—We have to note a further advance to \$5.25, and, with light stocks, holders are very firm.	
PITTSBURGH.	
Office of The Iron Age, 77 Fourth Avenue, Pittsburgh, Pa., Jan. 20, 1880.	
The principal local event the past week was the strike by the coal miners, the effect of which has been serious to all large consumers, as the price has gone up fully \$2 per bushel. In addition to the enhanced cost, there is an actual scarcity, and some of our mills have been obliged to curtail operations in consequence. These coal miners appear to have an innate propensity for striking; as soon as they get a little money ahead they are ready for a strike, and while occasionally they gain their point, they are always the greatest sufferers in the end. Some of the operators whose mines are located along the railroads, and who have contracts here and elsewhere, have succumbed, but most of the river operators are still holding out and refuse to pay the advance. These strikes have a bad effect upon general business, as coal is a very important factor in the production of all our leading manufactures, and an advance of 2¢ @ 3¢ per bushel counts up, especially with those of our manufacturers who are sold ahead, and cannot charge it up to the buyer	
Muck Bars.—The market has been rather quiet, but holders are generally firm at \$60. Some sales have been made at slightly lower figures, but \$60 may now be regarded as a fair quotation.	
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Steel Balls	

PATENT DECISION.

Hardware dealers will please take notice of the decree of Judge Lowell, of the United States Circuit Court, in the case of Millers Falls Company against Quimby S. Backus, for infringement of Bit Brace Patents, which decree was in favor of the Millers Falls Company. The full text of the opinion may be found on page 11 of *The Iron Age*, of date December 13, 1879.

We have now obtained three separate decrees against three different manufacturers, and shall continue to prosecute all infringers. When the manufacturers are able to pay the damages we shall in no case trouble dealers, but when manufacturers are unable to pay we must ask the dealers to remunerate us, else responsible dealers might combine with irresponsible makers to render worthless the most valuable patents. Any reasonable man can see the point, and we have before given all dealers sufficient notice.

MILLERS FALLS CO.,
74 Chambers street, New York.

F. HABERMAN,
MANUFACTURER OF
STAMPED, JAPANNED AND PLAIN
TINWARE.
DEALER IN
House Furnishing Hardware,
AND
TINNERS' TOOLS AND MACHINES.

No. 294 PEARL STREET,

(Bet. Beekman & Peck Slip.)

NEW YORK.

"Climax" Reversible Ice Creeper.

PATENTED APRIL 20, 1878.

A simple and sure prevention against falling on icy pavements. Easily adjusted to the boot or shoe. For prices and terms to the Trade, apply to the manufacturers.

CHILD'S, GROFF & CO.,
CLEVELAND, O.

FOR SALE BY

BIDDLE HARDWARE CO., Philadelphia.

PECK & SNYDER, New York.

SMITH, COVERT & CO., Albany.

J. P. PHINNEY & CO., Boston.

PRATT & CO., Buffalo.

EDWIN HUNT'S SONS, Chicago.

HAMILTON & MATHEWS, Rochester, N. Y.

LANE'S MEASURING FAUCET.

Price, \$3.00.

For Light or Heavy Molasses, Oils, Varnishes or other Fluids.

We warrant these Faucets to be as represented, measuring correctly and working more accurately than any other Measuring Faucet in the market. No grocer can afford to be without them, for they save time, and "time is money." They insure perfect cleanliness, and no loss of liquid, due to the crank to collect dirt and draw fluid. They do not drip. They prevent all waste, as no molasses or other fluid can pass except when the crank is turned. They are made of the best of simplicity, and convenience, there are always in order. They work easily in the heaviest molasses. They are warranted to measure correctly, according to U. S. Standard.

MANUFACTURED EXCLUSIVELY BY

LANE BROS., Millbrook, N. Y.

General Agency, GRAHAM & HAINES, 113 Chambers St., New York.

NICHOLS' SELF-ACTING ACID PUMP.

Absolute Safety!

Perfect Ease!

Time, Labor and Material saved by using the

NICHOLS' ACID PUMPS, to draw all kinds of acids from carboys. Every pump warranted. Send for new circular and price list. Manufactured only by

Acid Pump & Siphon Co.

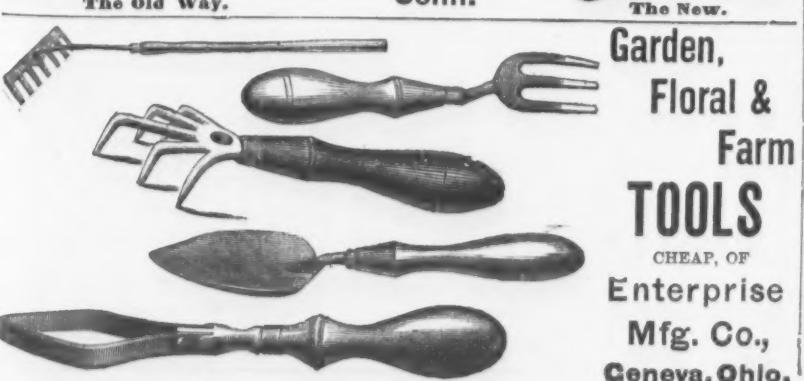
New London, Conn.

RIEHLÉ BROS.
STANDARD
SCALES
AND
TESTING
MACHINES

Patent "Self-Adjusting" Railroad Track Scales, pronounced "the most accurate and durable" over all competitors at World's Fair, 1876. In use by Pennsylvania, Lehigh Valley, Baltimore and Ohio, and other Railroads. Patent Coal and Hay Scales. Warehouse and Platform Scales; also for all purposes. Machines for testing materials, all sizes. Works, 9th st., a Master; Store, 528, 6th st., Philadelphia, New York Office, 61 Liberty Street.

"DRAW CUT"
BUTCHERS' MACHINES.
Choppers, Hand and Power Stuffers,
Lard Presses, Warranted thoroughly made and the best in use.
MURRAY IRON WORKS, Burlington, Iowa.

R. C. PURVIS,
Manufacturer of
Octagon
Tea Pots.
Rear of 407 Cherry St., Philadelphia, Pa.
Send for Price List.



**NATIONAL
Horse Nail Co.**
MANUFACTURERS OF
FINISHED
[BRIGHT OR BLUED]



These nails are made of the best brands of NORWAY IRON, and are guaranteed to be equal to any in the market.

NATIONAL HORSE NAIL CO.,
VERGENNES, VT.
DURRIE & McCARTY, Agents,
No. 97 Chambers St., New York

The Oldest Shot Tower in America.
FOUNDED JULY 4, 1808.



THOMAS W. SPARKS,
Manufacturer of
SPARKS'
American Chilled Shot,
Rivaling the English and all Others.
STANDARD DROP & BUCK SHOT
AND BAR LEAD.

191 Walnut Street, Philadelphia.

**THE
Sprague Novelty Works,**
15, 17 & 19 North Water Street,
ROCHESTER, N. Y.,
Manufacturers of

Hardware Specialties,
SPRACUE'S

"Perfection," "Combination" and other Razor Straps.
Refer to *The Iron Age* first issue of each month.

A. F. PIKE,
East Haverhill, New Hampshire,
Manufacturer and Wholesale Dealer in
Scythe, Axe, Knife and Hacker

STONES.
Factories at Haverhill and East Haverhill, N. H., and Evansville and Westmore, Vt.

Genuine OLD RELIABLE, INDIAN POND (Red Ends), LAMOTHE, DIAMOND GRIT, UNION, VINE MOUNTAIN, PREMIUM, GREEN MOUNTAIN, MOLINE, LAGE.

Stones gotten up and labeled in any style desired.

PRICE AND QUALITY GUARANTEED.

All the above Stones are of good keen grit and will not glaze.

111 Liberty Street,
NEW YORK.

Established in 1839.

Formerly L. & A. G. COES.

L. COES & CO.
Manufacturers of L. Coes,
GENUINE IMPROVED
AND MECHANICS
Wide Bar Full Length.

Wide Bar Full Length.
Patent Screw Wrenches

UNDER PATENTS DATED

JUNE 26, 1866,
MARCH 23, 1869,
REISSUED 1870.

NOVEMBER 10, 1863,
FEBRUARY 23, 1864,
REISSUED JUNE 1, 1869,
IMPROVED AUG. 1, 1877.

The back thrust when in use borne by the SHANK instead of the Hand'e.
None genuine unless stamped "L. COES & CO."

WORCESTER, MASS.

Warehouse, 97 Chambers St. & 81 Reade St., N. Y.
DURRIE & McCARTY, Sole Agents.

No. 00 PENNSYLVANIA

MEAT CUTTER



The only Cutter up on the Market which is required the entire year for family purposes.

READ THE POINTS.

This is the only Cutter ever put on this market that entirely fills the requirements of a Family Meat Cutter, Mincer and Chopper. Being very compact, one pound of meat can be cut as readily as a larger quantity, (which is not the case with other Cutters), while it will cut sausage adapted for cutting cooked meats, such as are intended for Breakfast Hash or Mince Meat, also for Suet, doing the work in a few moments that would require hours with a mincing knife, and which cannot be properly done with the usual meat cutters gotten up especially for sausage meat. For these purposes it is used without the spout; but for sausage meat a good heavy white metal spout is affixed. (See cut.) They come complete with clamp so they can be clamped on a table or taken off at pleasure. The outside is nicely japanned and edges painted. The inside covered with "White French Enamel," so they can be easily and nicely cleaned as well as making them attractive machines. There is no other Meat Cutter upon the market that will take the place of Meat Choppers sold for this express purpose but cost three times the money. A trial solicited. No. 00 Improved Pennsylvania Meat Cutter, Price, per doz., \$28. Discount 40 & 10%.

LLOYD, SUPPLEE & WALTON, Philadelphia.

DURRIE & McCARTY, New York City.



SPEAKING TUBES.

Patented April 24th 1879.

We call the attention of the trade to the whistle for speaking tubes, represented in above cut, as being superior, in a mechanical point of view, on account of the

PATENT ELLIPTIC SPRING,

which is much less liable to break and get out of order than the spiral spring usually used. These whistles being made entirely of metal, are very strong and durable. They are offered in a variety of styles at very reasonable prices. Send for illustrated circular and quotations.

We also invite an examination of our **PATENT REVERSIBLE DOOR LOCKS**, which by their peculiar construction, combine simplicity, strength and durability. In these Locks the combination of the Patent Lever and Spring renders the latch movement very easy and prompt in action.

Illustrated catalogues and price lists furnished on application.

TRENTON LOCK AND HARDWARE CO.,
Manufacturers of Superior Building Hardware.

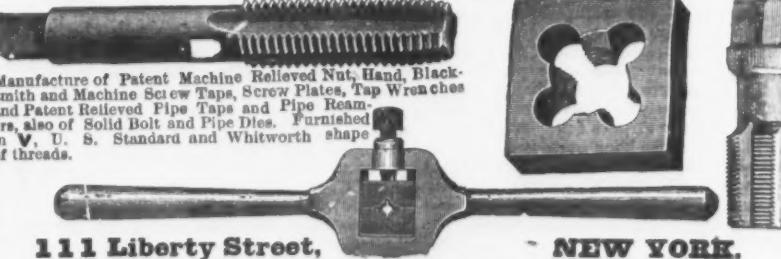
Trenton, N. J.

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JAMES M. VANCE & CO., 211 Market St., Philadelphia, Pa.; JAMES MARSHALL, 48 Warren St., New York.

H. S. MANNING & CO.,

Sole Sales Agents for THE MORSE TWIST DRILL AND MACHINE CO.'S



Manufacture of Patent Machine Relieved Nut, Hand, Blacksmith and Machine Screw Taps, Screw Plates, Tap Wrenches and Patent Relieved Pipe Taps and Pipe Reamers, also of Solid Bolt and Pipe Dies. Furnished in V. U. S. Standard and Whitworth shape of threads.

111 Liberty Street,

NEW YORK.

WM. R. HARTIGAN, Burlington, Ct.

Manufacturer of all kinds of

TOOL HANDLES AND SEAT STICKS FOR CARRIAGES, &c. Also all kinds of Enamelled Goods made of wood, such as Drop Knobs, Furniture Knobs, Organ Stops, Brush Handles, &c., &c. Also sole manufacturer of the Patent ANTI-NERVOUS, TRIANGULAR PENHOLDER. Send for Catalogue and Price List before purchasing.

W. R. EMMONS, Agent, 132 Duane St., New York.

RHODE ISLAND HORSE SHOE CO.,

MANUFACTURERS OF

Horse, Mule & Snow Shoes of the Perkins Pattern.

Works at Valley Falls, R. I., and Buffalo, N. Y. Office, 31 Exchange Place, Providence, R. I.

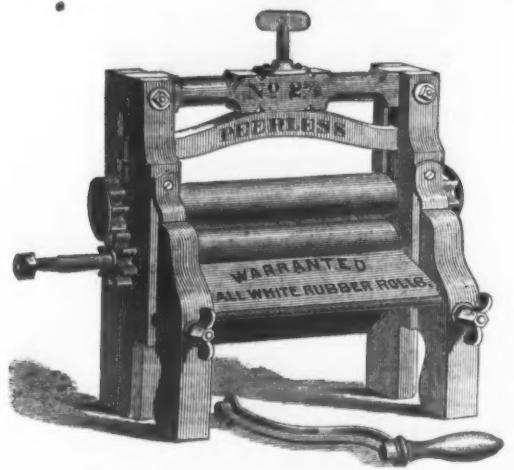
F. W. CARPENTER, President. C. H. PERKINS, Gen'l Manager. R. W. COMSTOCK, Secretary.

The Iron Age Directory

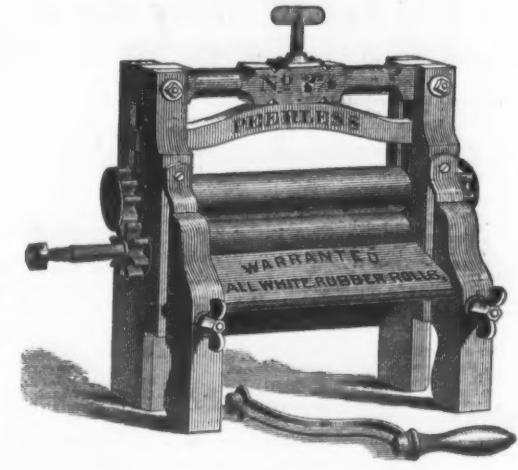
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Cook & Sons, Winsted, Conn.	29	Flame, Plastered Sheet. <i>Manufacturers of.</i>	Iron, Plastered Sheet, Manufacturers of	4	Wheeler.	Wheeler, 10th and Copper Co., 19 and 21 Cliff, N. Y.				
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Sprengle L. Jeff., Ashland, Ohio.	20	Flame, Plastered Sheet. <i>Manufacturers of.</i>	Iron, Plastered Sheet, Manufacturers of	4	Wheeler.	Wheeler, 10th and Copper Co., 19 and 21 Cliff, N. Y.				
Bags.	Kimball & Kimball, Philadelphia.	29	Flame, Plastered Sheet. <i>Manufacturers of.</i>	Iron, Plastered Sheet, Manufacturers of	4	Wheeler.	Wheeler, 10th and Copper Co., 19 and 21 Cliff, N. Y.			
Scut H. B. & Co., Buffalo, N. Y.	11	Flame, Plastered Sheet. <i>Manufacturers of.</i>	Iron, Plastered Sheet, Manufacturers of	4	Wheeler.	Wheeler, 10th and Copper Co., 19 and 21 Cliff, N. Y.				
Shelton & Co., Birmingham, Ct.	20	Flame, Plastered Sheet. <i>Manufacturers of.</i>	Iron, Plastered Sheet, Manufacturers of	4	Wheeler.	Wheeler, 10th and Copper Co., 19 and 21 Cliff, N. Y.				
Bellows. <i>Manufacturers of.</i>	Scott Geer, M., Chicago, Ill.	20	Flame, Plastered Sheet. <i>Manufacturers of.</i>	Iron, Plastered Sheet, Manufacturers of	4	Wheeler.	Wheeler, 10th and Copper Co., 19 and 21 Cliff, N. Y.			
Belt Plates.	Bevin Bros. Mfg. Co., Easthampton, Conn.	32	Flame, Plastered Sheet. <i>Manufacturers of.</i>	Iron, Plastered Sheet, Manufacturers of	4	Wheeler.	Wheeler, 10th and Copper Co., 19 and 21 Cliff, N. Y.			
Belt Plates.	Beadon & Adamson, 73 Market, Phila.	21	Flame, Plastered Sheet. <i>Manufacturers of.</i>	Iron, Plastered Sheet, Manufacturers of	4	Wheeler.	Wheeler, 10th and Copper Co., 19 and 21 Cliff, N. Y.			
Flint Plates.	Shepard Hardware Co., Buffalo, N. Y.	27	Flame, Plastered Sheet. <i>Manufacturers of.</i>	Iron, Plastered Sheet, Manufacturers of	4	Wheeler.	Wheeler, 10th and Copper Co., 19 and 21 Cliff, N. Y.			
Flint Plates.	Forbes, Portable, 1st and 2nd, N. Y.	25	Flame, Plastered Sheet. <i>Manufacturers of.</i>	Iron, Plastered Sheet, Manufacturers of	4	Wheeler.	Wheeler, 10th and Copper Co., 19 and 21 Cliff, N. Y.			
Flint Plates.	Waukegan Iron Works, 20, Phila.	23	Flame, Plastered Sheet. <i>Manufacturers of.</i>	Iron, Plastered Sheet, Manufacturers of	4	Wheeler.	Wheeler, 10th and Copper Co., 19 and 21 Cliff, N. Y.			
Flint Plates.	Waukegan Iron Works, 20, Phila.	23	Flame, Plastered Sheet. <i>Manufacturers of.</i>	Iron, Plastered Sheet, Manufacturers of	4	Wheeler.	Wheeler, 10th and Copper Co., 19 and 21 Cliff, N. Y.			
Flint Plates.	Waukegan Iron Works, 20, Phila.	23	Flame, Plastered Sheet. <i>Manufacturers of.</i>	Iron, Plastered Sheet, Manufacturers of	4	Wheeler.	Wheeler, 10th and Copper Co., 19 and 21 Cliff, N. Y.			
Flint Plates.	Waukegan Iron Works, 20, Phila.	23	Flame, Plastered Sheet. <i>Manufacturers of.</i>	Iron, Plastered Sheet, Manufacturers of	4	Wheeler.	Wheeler, 10th and Copper Co., 19 and 21 Cliff, N. Y.			
Flint Plates.	Waukegan Iron Works, 20, Phila.	23	Flame, Plastered Sheet. <i>Manufacturers of.</i>	Iron, Plastered Sheet, Manufacturers of	4	Wheeler.	Wheeler, 10th and Copper Co., 19 and 21 Cliff, N. Y.			
Flint Plates.	Waukegan Iron Works, 20, Phila.	23	Flame, Plastered Sheet. <i>Manufacturers of.</i>	Iron, Plastered Sheet, Manufacturers of	4	Wheeler.	Wheeler, 10th and Copper Co., 19 and 21 Cliff, N. Y.			
Flint Plates.	Waukegan Iron Works, 20, Phila.	23	Flame, Plastered Sheet. <i>Manufacturers of.</i>	Iron, Plastered Sheet, Manufacturers of	4	Wheeler.	Wheeler, 10th and Copper Co., 19 and 21 Cliff, N. Y.			
Flint Plates.	Waukegan Iron Works, 20, Phila.	23	Flame, Plastered Sheet. <i>Manufacturers of.</i>	Iron, Plastered Sheet, Manufacturers of	4	Wheeler.	Wheeler, 10th and Copper Co., 19 and 21 Cliff, N. Y.			
Flint Plates.	Waukegan Iron Works, 20, Phila.	23	Flame, Plastered Sheet. <i>Manufacturers of.</i>	Iron, Plastered Sheet, Manufacturers of	4	Wheeler.	Wheeler, 10th and Copper Co., 19 and 21 Cliff, N. Y.			
Flint Plates.	Waukegan Iron Works, 20, Phila.	23	Flame, Plastered Sheet. <i>Manufacturers of.</i>	Iron, Plastered Sheet, Manufacturers of	4	Wheeler.	Wheeler, 10th and Copper Co., 19 and 21 Cliff, N. Y.			
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Flint Plates.	Waukegan Iron Works, 20, Phila.</									



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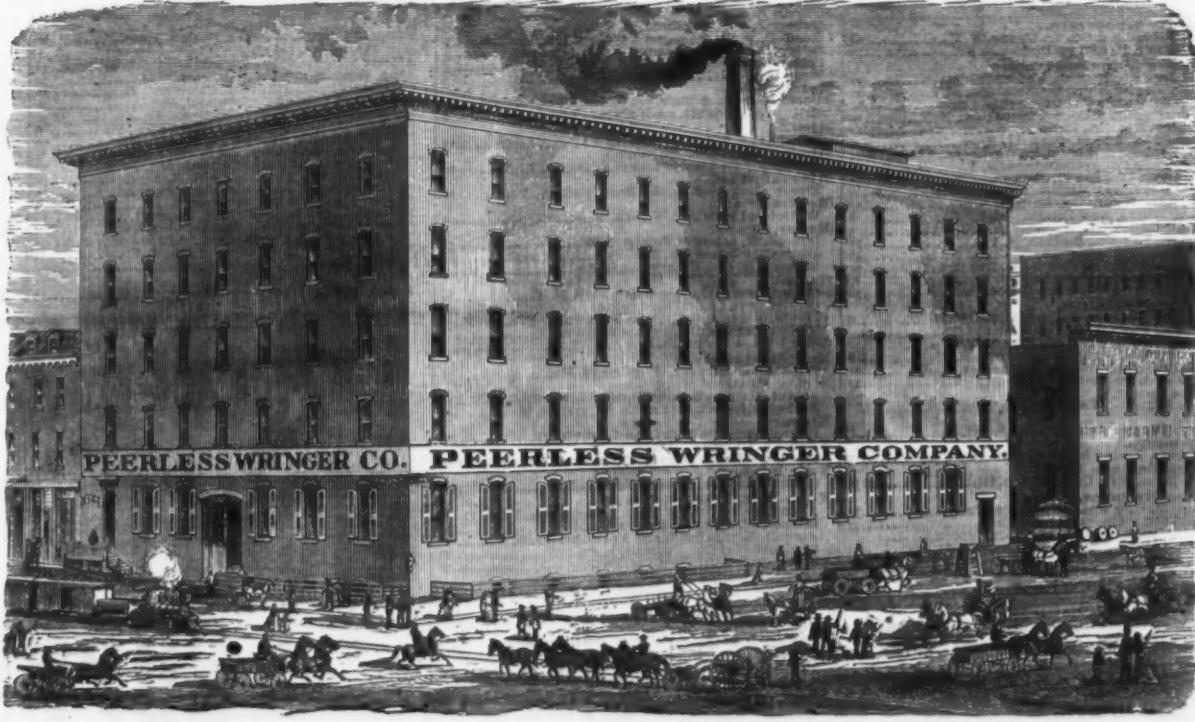
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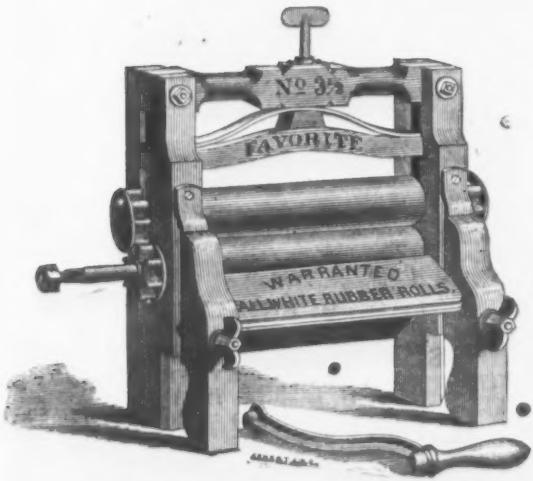
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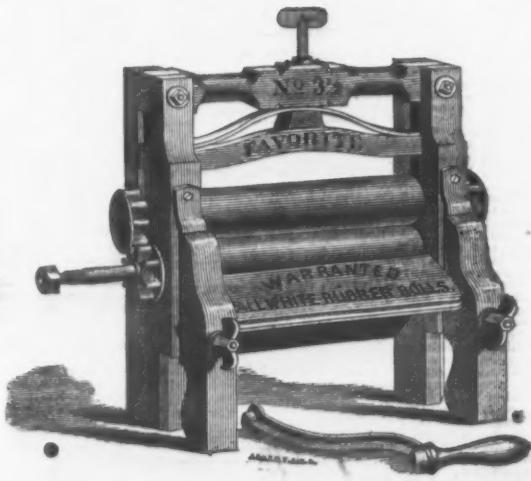
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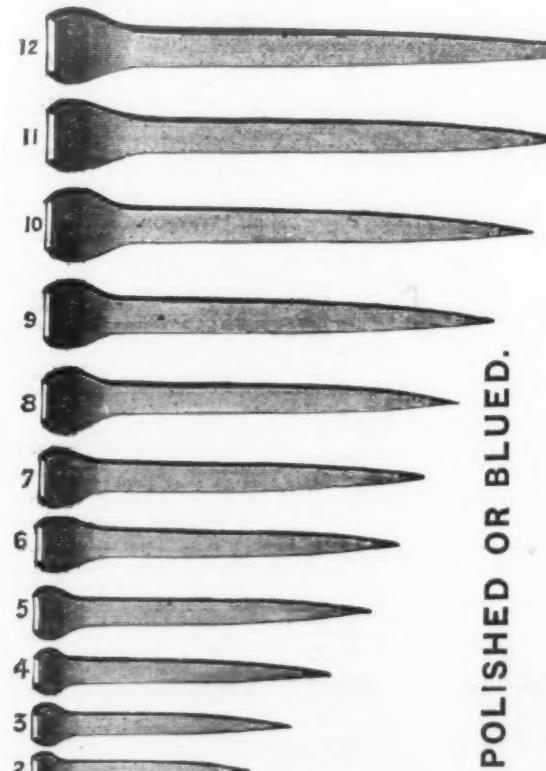
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" Iron, Painted, w/ foot 90. dis 40&10%	
Barn Door, 16 1/2" and 18" in.	dis 40&10%
" For N. E. Hangers.	dis 40&10%
Barrels.	
Cast Steel.	dis 15%
" 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82 84 86 88 90 92 94 96 98 100 102 104 106 108 110 112 114 116 118 120 122 124 126 128 130 132 134 136 138 140 142 144 146 148 150 152 154 156 158 160 162 164 166 168 170 172 174 176 178 180 182 184 186 188 190 192 194 196 198 200 202 204 206 208 210 212 214 216 218 220 222 224 226 228 230 232 234 236 238 240 242 244 246 248 250 252 254 256 258 260 262 264 266 268 270 272 274 276 278 280 282 284 286 288 290 292 294 296 298 300 302 304 306 308 310 312 314 316 318 320 322 324 326 328 330 332 334 336 338 340 342 344 346 348 350 352 354 356 358 360 362 364 366 368 370 372 374 376 378 380 382 384 386 388 390 392 394 396 398 400 402 404 406 408 410 412 414 416 418 420 422 424 426 428 430 432 434 436 438 440 442 444 446 448 450 452 454 456 458 460 462 464 466 468 470 472 474 476 478 480 482 484 486 488 490 492 494 496 498 500 502 504 506 508 510 512 514 516 518 520 522 524 526 528 530 532 534 536 538 540 542 544 546 548 550 552 554 556 558 560 562 564 566 568 570 572 574 576 578 580 582 584 586 588 590 592 594 596 598 600 602 604 606 608 610 612 614 616 618 620 622 624 626 628 630 632 634 636 638 640 642 644 646 648 650 652 654 656 658 660 662 664 666 668 670 672 674 676 678 680 682 684 686 688 690 692 694 696 698 700 702 704 706 708 710 712 714 716 718 720 722 724 726 728 730 732 734 736 738 740 742 744 746 748 750 752 754 756 758 760 762 764 766 768 770 772 774 776 778 780 782 784 786 788 790 792 794 796 798 800 802 804 806 808 810 812 814 816 818 820 822 824 826 828 830 832 834 836 838 840 842 844 846 848 850 852 854 856 858 860 862 864 866 868 870 872 874 876 878 880 882 884 886 888 890 892 894 896 898 900 902 904 906 908 910 912 914 916 918 920 922 924 926 928 930 932 934 936 938 940 942 944 946 948 950 952 954 956 958 960 962 964 966 968 970 972 974 976 978 980 982 984 986 988 990 992 994 996 998 999 1000	
Barrel Straps.	
Razor Straps.	dis 40%
Genuline Emerson.	dis 40%
Badger's Emerson.	dis 40%
Bent & Call Co.'s.	dis 40%
Evans.	dis 40%
Imitation Emerson.	W. dos \$2.75, dis 40&10%
Hunt's.	dis 40&10%
Chase's.	dis 40&10%
Bauders.	dis 40&10%
Torrey's.	dis 40&10%
" Silver.	dis 40&10%
Iron and Tinned.	new list Oct. 1, 1879
in bulk.	dis 30%
Copper Rivets and Burs.	dis 25%
Nos. 8 9 10 11 12 13 14 15	
" 16 17 18 19 20 21 22 23 24 25 26	
Tinned Iron Belt Rivets and Burs.	dis 35%
Hivet Sets.	dis 25%
Bands.	
Stair.	New list, March 1, 79, dis 25%
" American Patent.	dis 40%
Belts.	
Hollister's.	dis 25%
Sargent's list.	dis 25%
Novelties.	dis 10%
Acme (Anti-Friction).	dis 40%
Hoops.	Manufacturers' Net List, Dec. 10, 1879.
Manila.	1/2 inch and larger, W. dos 14&10%
" 1/4 inch and larger.	W. dos 14&10%
" 1/8 inch and larger.	W. dos 14&10%
" 1/16 inch and larger.	W. dos 14&10%
" 1/32 inch and larger.	W. dos 14&10%
" 1/64 inch and larger.	W. dos 14&10%
" 1/128 inch and larger.	W. dos 14&10%
" 1/256 inch and larger.	W. dos 14&10%
" 1/512 inch and larger.	W. dos 14&10%
" 1/1024 inch and larger.	W. dos 14&10%
" 1/2048 inch and larger.	W. dos 14&10%
" 1/4096 inch and larger.	W. dos 14&10%
" 1/8192 inch and larger.	W. dos 14&10%
" 1/16384 inch and larger.	W. dos 14&10%
" 1/32768 inch and larger.	W. dos 14&10%
" 1/65536 inch and larger.	W. dos 14&10%
" 1/131072 inch and larger.	W. dos 14&10%
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" 1/8388608 inch and larger.	W. dos 14&10%
" 1/16777216 inch and larger.	W. dos 14&10%
" 1/33554432 inch and larger.	W. dos 14&10%
" 1/67108864 inch and larger.	W. dos 14&10%
" 1/134217728 inch and larger.	W. dos 14&10%
" 1/268435456 inch and larger.	W. dos 14&10%
" 1/536870912 inch and larger.	W. dos 14&10%
" 1/107374184 inch and larger.	W. dos 14&10%
" 1/214748368 inch and larger.	W. dos 14&10%
" 1/429496736 inch and larger.	W. dos 14&10%
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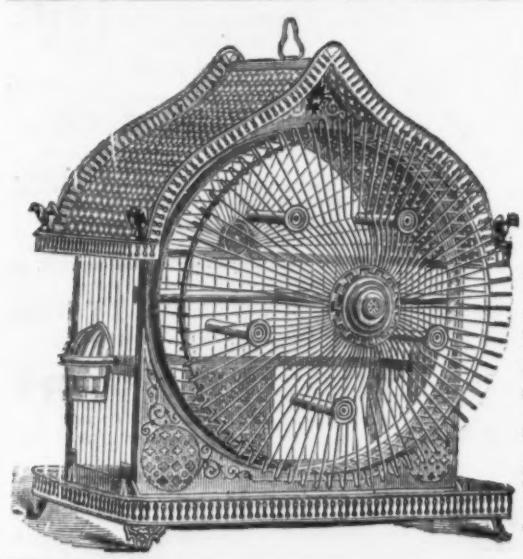
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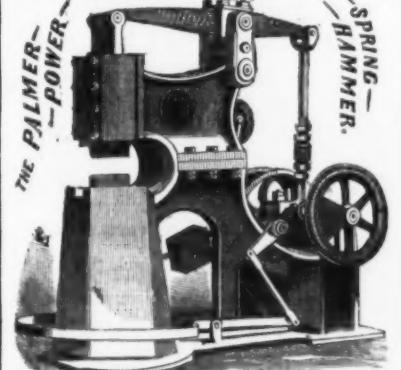
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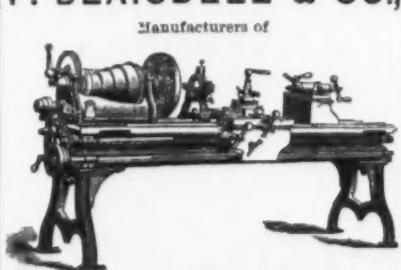
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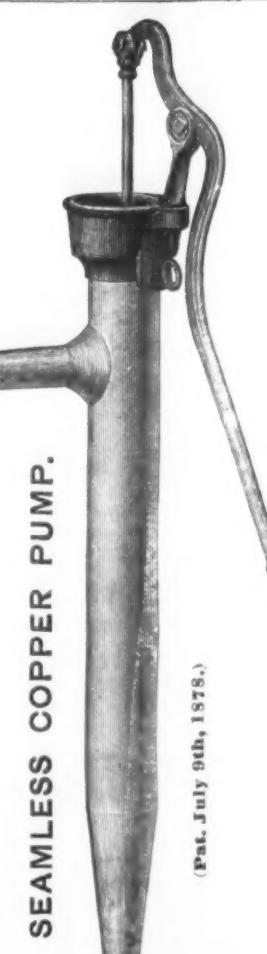


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PHILADELPHIA SMELTING COMPANY, CITY.—GENTLEMEN: After a trial of eighteen months of your "Deoxidized Bronze" as journal boxes in our rolling mill, where great pressure is required, we take pleasure in recommending it as being superior to any we have heretofore used.

Very truly, HENRY DISSTON & SONS.

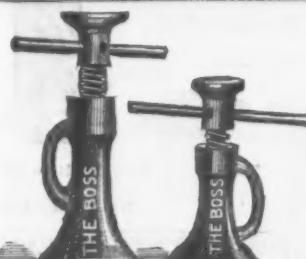
"THE BOSS" JACK-SCREW.

R. D. WYNN,

Windsor, Vt., U. S. A.

Sole manufacturer of the above Screw. Indorsed by builders, railroad and mining men as the best screw jack in the market. Also manufactures Press Screws, Lard and Wine Presses, Tackle Blocks, &c. Circulars and prices, address as above. (Please say *The Iron Age*.)

Agents, Pusey & Chapman, 8 Liberty St., New York; Sam'l May & Co., 16, 18 & 20 Oliver St., Boston.



WIRE NAILS

French Points,

Window Shade Nails,

Upholstering, WAGON NAILS, Molding Nails,

(Sample Cards sent on application.)

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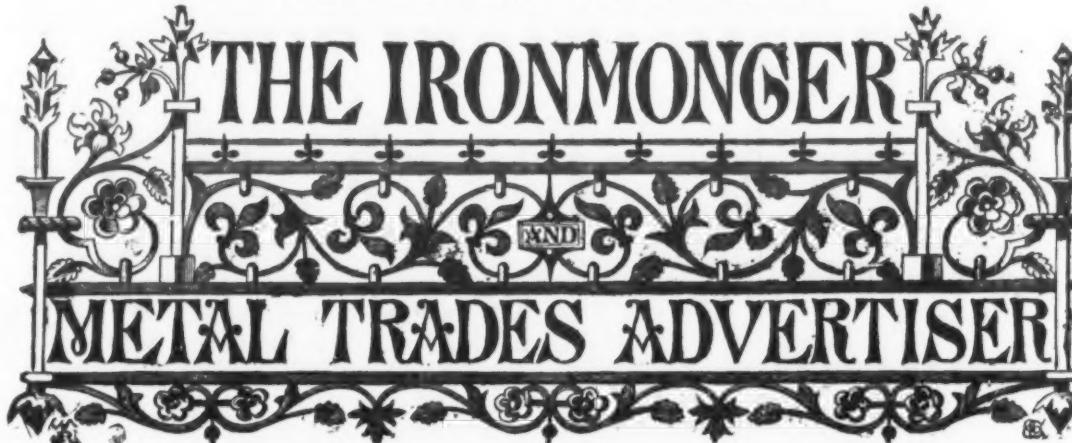
Roofing Nails,

Barbed Caster Nails.

Veneer Nails, Label Tacks and small Nails of all kinds, Cabinet Nails, Barbed Lock Nails, Cigar Box Nails, &c., &c., put up in bulk, 5 lb. package lb. papers, or as waisted.

AMERICAN WIRE NAIL CO.
Factory, Fifteenth and Madison Sts. COVINGTON, KY.

ESTABLISHED IN 1859.



PUBLISHED EVERY SATURDAY.

THE OLDEST AND CHIEF REPRESENTATIVE OF THE IRON, HARDWARE AND METAL TRADES.

OFFICE: 44a CANNON STREET, LONDON, E. C.

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Notes of Novelties.—This is a department of the journal always watched with interest by the trade, as it contains an account, from week to week, of the novelties which manufacturers and inventors are introducing to the notice of the trade. These articles are freely illustrated.

Special Correspondents.—The Ironmonger has a deserved reputation for its special correspondence from all the principal Continental, British and manufacturing centers. The writers are gentlemen holding important positions in the districts with which they are connected, and possess facilities for acquiring information specially suited for the columns of the Ironmonger. The Week, Legal News, Trade Notes, Bankruptcies, Foreign Notes, Colonial Jottings, Merchants' Circulars, Imports and Exports, &c., are each departments of the journal, containing a digest of all matters of direct interest to the Iron, Hardware and Metal Trades. In addition to the above, there is a carefully classified list of Patents, together with Editorial Notes, French, Belgian and other Special Correspondence.

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This is an annual, presented free to every subscriber to the Ironmonger and Metal Trades' Advertiser. It contains a large number of ruled skeleton pages for diary and other entries, and in addition much useful reference information, varied from year to year. It is handsomely bound in gold gilt; and as copies are used in thousands of establishments for a whole year, it is obviously a medium of exceptional value for advertisements. Sold to non-subscribers at 75 cents.

THE FOREIGN SUPPLEMENT

is published every fourth week in connection with the extensive and world-wide circulation of the Ironmonger itself. The dates of its publication in 1879 will be as follows:

JANUARY 11, FEBRUARY 8, MARCH 5, APRIL 5, MAY 3 and 31, JUNE 28, JULY 26, AUGUST 23, SEPTEMBER 20, OCTOBER 18, NOVEMBER 15, DECEMBER 13.

This Supplement is published in

FIVE LEADING COMMERCIAL LANGUAGES

of the world, including English, and is sent to all the countries where they are spoken, thus placing the contents of the Ironmonger not only within reach of the speaking people; or, in all, over two hundred millions of inhabitants in the principal nations where the best purchasers of manufactured goods are to be found.

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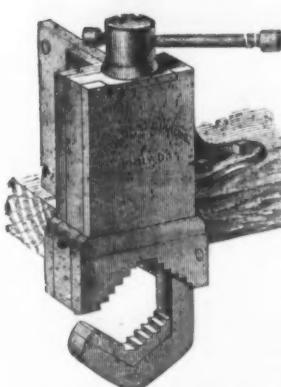
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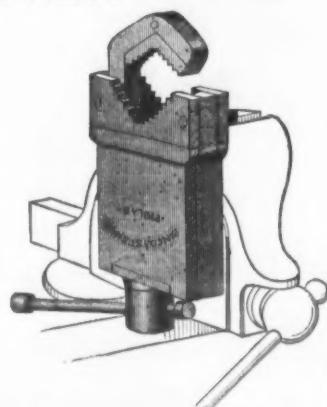
THE WHOLE FOREIGN HARDWARE TRADE,

so far as our experience of twenty years is concerned, will be covered by THE FOREIGN SUPPLEMENT at least twice a year. Thus a Price List or Advertisement inserted in the Ironmonger and Foreign Supplement is a strikingly powerful and most efficient way of publicity not to be compared with any of the other ordinary channels of communication.

IMPROVED PIPE-FITTERS' VISE.



STRONG,
LIGHT,
EFFICIENT,
CHEAP.



To meet the requirements of the large number of persons who have use for such an article, we invite attention to our Improved Pipe Vise. This Vise can be used either as a permanent fixture to work-bench, attached to angle plate or can (unlike others) be held between the jaws of any Machinist's or Blacksmith's Vise; the movable jaw being OPEN ON SIDE permits work to be gripped at any desired point without slipping it in front end, and allows of turning work around; the Body is made of cast steel, and the jaws of wrought iron, and the pins of solid Steel throughout. The Steel Gripping Jaws can be duplicated and replaced at any time when worn out. It is a very convenient tool, well adapted to the wants of Plumbers, Pump Fitters, Well-Drivers, and all who have use for a tool that is strong, light, efficient and cheap, which can be readily carried about with kit of tools.

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PANCOAST & MAULE,
943 and 945 South Third Street, Philadelphia.

Wheeler, Madden & Clemson
MFG. CO.,
MIDDLETOWN, NEW YORK.

Manufacturers of
WARRANTED CAST STEEL

SAWS

Of every description, including

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WOOD SAWS, Etc., Etc.

AMERICAN SAW CO.,

Manufacturers of

Movable Tooled Circular Saws,

PERFORATED CROSS-CUT SAWS

And SOLID SAWS of all kinds.

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Greenfield, Mass.

THE GREEN RIVER TIRE UPSETTER.

LIGHTNING

Screw-Cutting Machinery and
Tools,

Bolt Cutters, for hand or power.

Screw Plates, cutting from wire
sizes to 1 1/2 inch.

Green River Drilling Machines, for
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Green River Tire Benders.

" Tire Upsetters.

" Tire Measuring Wheels.

Tire Bolt Wrenches, Nut Wrenches.

Horse Shoers' Vises.

Taps and Dies for pipe, Bit Braces.

Taps, Dies and Reamers, &c., &c.

Send for Illustrated Price List.



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MANUFACTURED BY

A. F. CUSHMAN,
Hartford, Conn., U. S. A.

Independent 4-Jawed Chucks, from 6 in. to 24 in. in diameter. Common Lever Scroll Chucks, from 3 in. to 24 in. Patent Geared Chucks, from 3 in. to 12 in. Common Geared, from 2 in. to 12 in. A large variety of Chucks for Amateurs' Foot Lathes. Drill Chucks for all kinds of machines and purposes. Patent Geared Chucks for Hollow Spindle Cutting-off Machines. Bench and portable Centering Chucks, and special chucks made to order. Satisfaction guaranteed. All of the above are from new patterns, with every improvement a long experience can suggest. Send for price list.

IMPORTANT TO RAILWAY COMPANIES, CITIES AND MINE OWNERS.
Blake's Challenge Rock Breaker or Sectional Cushioned Crusher,
Patented Nov. 18, 1879, will be found the most economical and reliable crusher ever offered to the public for crushing railway ballast, road metal, stone for iron castings, manganese, plaster, soapstone, &c., &c. This machine dispenses with cast iron frame and pitman of our old forms. All strains are on wrought iron or steel. Over 20 Medals, including Paris Gold and Silver Medals. Address,
BLAKE CRUSHER CO., Sole Makers, New Haven, Conn.

THE E. HORTON & SON CO.,
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From this date a discount of 30 per cent will be made from the price
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HORTON LATHE CHUCK.

They also manufacture the Sweetland Improved Chuck.

Send for Price List.

TURNED
MACHINE SCREWS,
One sixteenth to five-eighths diameter.
Heads and points to match
IRON, STEEL AND BRASS.
JOHN FELLOWS,
Manufacturer to LYON & FELLOWS, Factory and Office, 14 Dunham Place, Williamsburgh, N. Y.

L. M. RUMSEY & CO.
MANUFACTURERS & JOBBERS OF
PUMPS & FIRE ENGINES,
LEAD PIPE, STEEL LEAD,
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PLUMBERS & STEAM FITTERS,
NO. 810, N. SECOND STREET,
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BRASS GOODS,
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PACKING & CO.

Manufacturers of GALVANIZED PUMP CHAIN FOR CHAIN PUMPS.



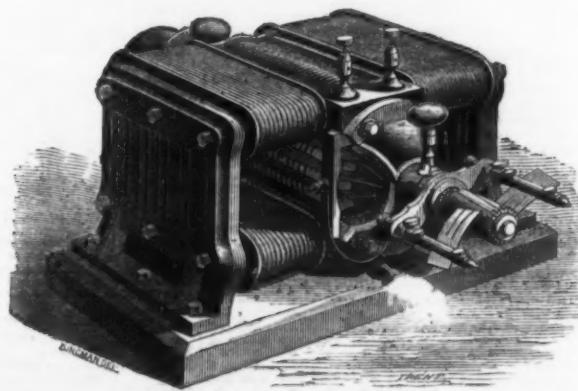
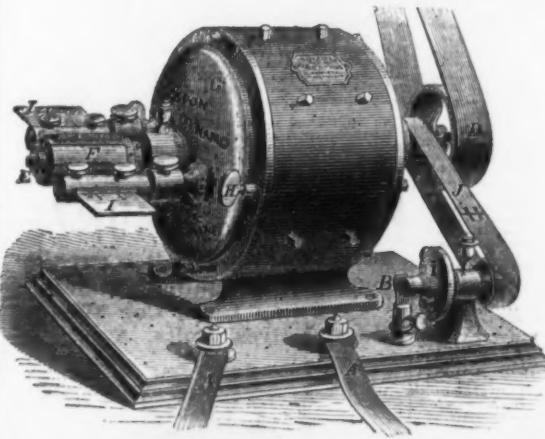
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Expanding, Self-Draining
RUBBER BUCKET.
Manufactured only by
L. M. RUMSEY & CO.

WESTON DYNAMO-ELECTRIC MACHINE CO.

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MANUFACTURERS OF

Machines for Electric Light, Electrotyping
and Electro-Plating.



ARE MAKING

THE MOST POWERFUL, SIMPLE AND COMPACT ELECTRIC LIGHT
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By actual tests this machine has been found to yield more than double the amount of light per horse-power obtained from the best machines built in this country.

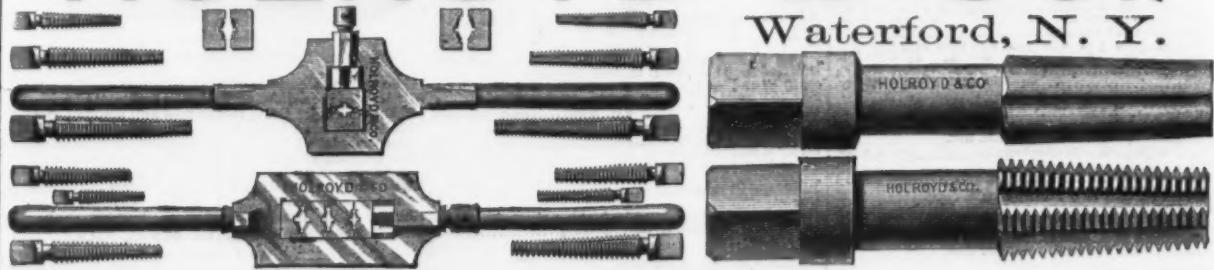
Please send full particulars regarding buildings or localities to be lighted, available power, &c.

Centennial Gold Medal American Institute, 1876. Medal of Superiority, American Institute, 1877.

Centennial Medal, Philadelphia, 1876. Paris Medal, 1878.

HOLROYD & CO..

Waterford, N. Y.



ARMSTRONG'S

Adjustable Stock and Dies
For Pipe and Bolts,

Have the following advantages:

1st.—The Armstrong Improved Dies can be adjusted to the variations in the size of fittings.

2d.—The Armstrong Dies, by reason of their peculiar cutting edge, can be worked with much less labor, and accomplish the desired results in less time, than with the solid Die.

3d.—The Armstrong Dies have a double taper, that is, the taper at the entrance for the first few threads is greater in degree than the standard taper, which forms a lead to the Dies, causing them to start on the pipe without filing, even when there is a swell or burr, and requiring no pressure whatever to start the Dies on the pipe.

4th.—The Armstrong Dies being made in two parts instead of one (as in the solid Die), can be more perfectly constructed; the cutting edges reached more directly; the work done with greater precision and uniformity, by which they accomplish a much better result.

5th.—The Armstrong Dies can be sharpened without drawing the temper, and can be kept in good condition easier and with less expense than any other Dies ever offered to the public. A mechanic can sharpen these Dies, and is not obliged to send them to the manufacturer, as is the case with solid Dies when they become dull.

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For sale by leading dealers in Hardware and Steam and Gas Fitters' Tools. For further particulars address,

F. ARMSTRONG, Bridgeport, Conn.

THE "ECLIPSE"

Hand Fan Blowers.

Every machine guaranteed or no sale. Is now improved by lever attachment. Works precisely like bellows lever, or, if preferred, crank can be used.

The trade are invited to write for terms, descriptive circulars, &c.

Also,

EXHAUST FANS

for ventilating mines.

Address,

EZRA F. LANDIS,

Sole Manufacturer,

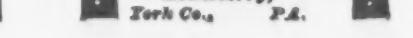
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HAMMOND'S
Window Springs

Support and lock sashes of all kinds and sizes; are very convenient, simple and durable, are easily and quickly operated, and always sure to hold sashes in most desired position. The window spring can be used in connection with a sash having weights as a lock. For sale by W. S. Hammond, wholesale houses. Circulars give 6 cuts and full instructions.

Samples mailed to the Trade free.

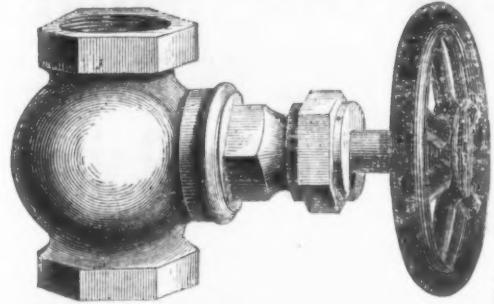
W. S. HAMMOND,
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McNab & Harlin Mfg. Co.,

MANUFACTURERS OF

BRASS COCKS AND VALVES,

For STEAM,
WATER
and GAS.Iron Pipe and Fittings.
PLUMBERS' MATERIALS

Factory, Paterson, N. J.

New Illustrated Catalogue and Price
List sent by express to the Trade on application.

56 John Street, N. Y.

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HOT PRESSED

Square & Hexagon Nuts,

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BOLTS,

SPIKES,

RIVETS. &c.

The Allentown Foundry and Machine Shops.

Established in 1835.

Old and reliable. Manufacture Steam Engines, Double Hoisting or Reversible Engines, Compound Engines, Boilers of any description, Power Pumps, Flange Pipes from 4 to 36 in. bore, Thomas' patented and Bradford's patent Ore Washers, Mining Machinery, Blast Furnace Work, Hot Blast Castings, Turbine Wheels, Shafting and Pulleys.

More than half of the Engines and Mining Machinery used in mining ores in the Lehigh Iron Districts were built here. We have more experience in iron ore mining machinery than any other party in Pennsylvania, having most excellent facilities for doing all kinds of engineering work. Our shops are connected by a switch with competing lines in all directions. Parties needing anything in our line will do well to consult us.

W. H. BARBER & BRO., Allentown, Pa.

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MANUFACTURES

STEAM

Hammers

LAND

AND

Marine Engines,

BLAST FURNACE

Machinery.

Send for Circulars.

Cleveland, Ohio, U. S. A.

THE J. MORTON POOLE COMPANY,
Wilmington, Delaware,

Beg to call the attention of manufacturers of Sheet, Hoop and Band Iron to their

Patent Roll Grinding Machines

for grinding the rolls used in said manufacture. By grinding such rolls, instead of turning, a much greater degree of accuracy is obtained, and as very much less metal is removed from the roll by the grinding operation, the rolls will last much longer. Our Grinding Machines produce perfectly accurate work, and will grind either straight or hollow.

NEW sizes Patent Malleable Iron Oilers,
Nos. 2 and 3.

NEW pattern Heavy Screw Clamps;

strongest in the market.

Send for Price List.

Malleable Iron Castings

of superior quality, and Hardware Specialties in

Malleable Iron made to order.

HAMMER & CO., Branford, Conn.

WEST READING PIPE AND
MACHINE WORKS.

Manufacturers of

Cast-Iron Water and Gas Pipe
of all sizes.Valves and Hydrants, Flange Pipe
and Lamp Posts. Machinery for
Grist, Saw and Rolling Mills. Also
the Cheapest and Best in the
world. Send for pamphlet.

READING PA.

NEW sizes Patent Malleable Iron Oilers,
Nos. 2 and 3.

pattern Heavy Screw Clamps;

strongest in the market.

Send for Price List.

Malleable Iron Castings

of superior quality, and Hardware Specialties in

Malleable Iron made to order.

HAMMER & CO., Branford, Conn.

Most powerful, accurate, durable and
cheapest. Any shaped teeth.

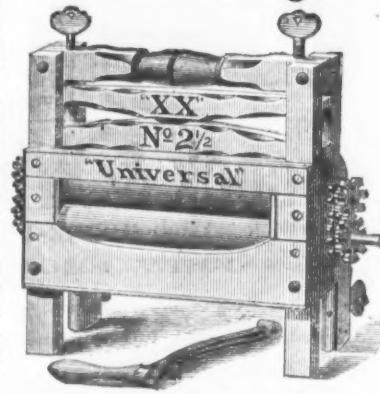
J. COMLY, Patentee,

LINCOLN PARK, N. J.

PRESSED STEEL
GEARING.Most powerful, accurate, durable and
cheapest. Any shaped teeth.

J. COMLY, Patentee,

LINCOLN PARK, N. J.

THE "OLD RELIABLE"
UNIVERSAL
Clothes Wringer.Improved with Rowell's Double Cog-Wheels on
both ends of each roll.

Over 500,000 sold!

And now in use, giving "Universal" satisfaction

EVERY WRINGER WARRANTED.

Be sure and inquire for the "Universal."

Sold by the Principal Jobbers in Hardware and House-Furnishing Goods everywhere.

Special rates given for export.

Metropolitan Washing Machine Co.

32 Cortlandt St., New York.

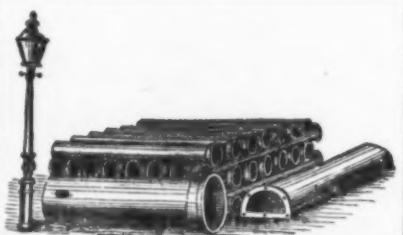
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Sole Manufacturers of

CARR'S PATENT

Water Closets,

PUMPS, CABINET WOOD WORK, &c.

100, 105 & 110 Centre Street,
Factory, Mott Haven, NEW YORK.

R. D. WOOD & CO.

Philadelphia,

Manufacturers of

Cast Iron Pipe

FOR WATER AND GAS.

Lamp Posts, Valves, &c.,

Mathew's Pat. Anti-Freezing Hydrants

400 CHESTNUT STREET.

STEAM PUMPS,

STEAM ENGINES,

Air Compressors,

HOISTING ENGINES.

The Norwalk Iron

Works Co.,

SOUTH NORWALK, CONN.



We guarantee this trap to work perfectly satisfactorily.

Order one; if not satisfied return at

any time, and we will refund the monthly saving in fuel, if it is less than the cost of trap. Send for circular. Price from

\$5 to \$15.

Jute.

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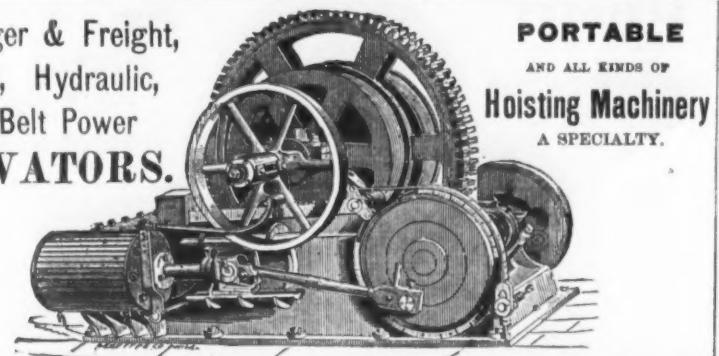
Copper Rivets.

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Passenger & Freight,
Steam, Hydraulic,
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ELEVATORS.



PORTABLE
AND ALL KINDS OF
Hoisting Machinery
A SPECIALTY.

IRON FURNACE HOIST,

For Handling Stock to Top of Stack with One or Two Platforms.

STOKES & PARRISH, 3001 Chestnut St., Philadelphia.

SHAPLEY ENGINE.

Patented Feb. 10, 1874.
Reissued June 22, 1875.

Compact, Practical, Durable and Economical.

Acknowledged to be the best in use. This boiler stands unrivaled.

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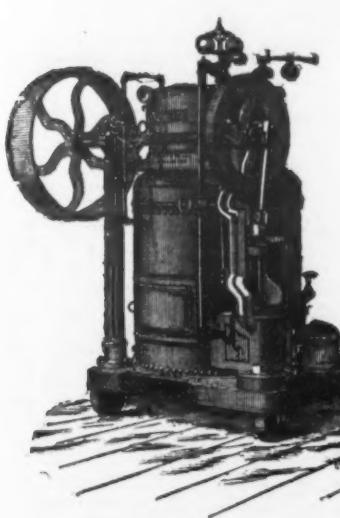
SHAPLEY & WELLS,

Binghamton Iron Works,
Binghamton, N. Y.

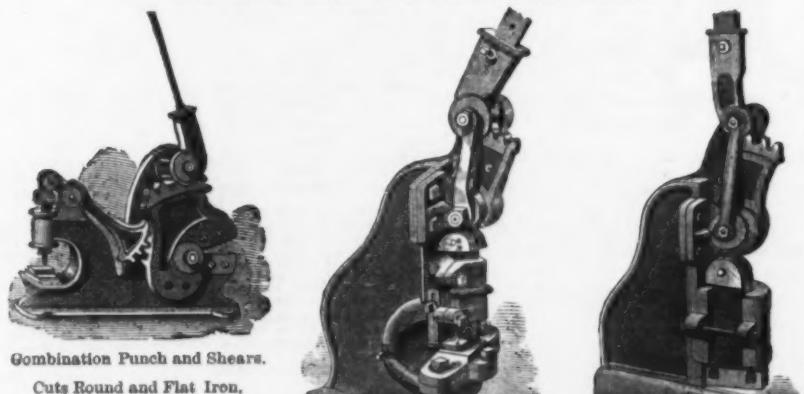
MANUFACTURERS OF

Stationary Engines and Boilers.

Also Machinery for Mills of all kinds and Tanneries. Also their celebrated Bark Mills, acknowledged to be the best. Send for reduced price list circular.



E. LYON & CO.,
No. 470 Grand Street, New York.



Combination Punch and Shears.
Cuts Round and Flat Iron.

Punch $\frac{1}{8}$ to $\frac{1}{2}$ in., $\frac{1}{4}$ in. Plates.

Shears for Plates and Bars

Lyon's Patent Hand and Power DRILLS, SHEARS AND PUNCHING PRESSES.

For Workers in Iron and Steel, adapted to all trades.

Send for circular and prices.

Ludlow Valve Mfg. Co.,

OFFICE AND WORKS:

938 to 954 River St. & 67 to 83 Vail Ave., Troy, N. Y.

VALVES.

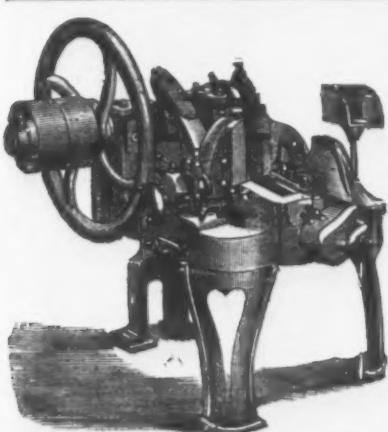
Double and Single Gate, $\frac{1}{4}$ in. to 48 in.—outside and inside Screws, Indicator, &c. for Gas, Water and Steam. Send for Circular.

Also FIRE HYDRANTS.

THORNE, DeHAVEN & CO., Drilling Machines,

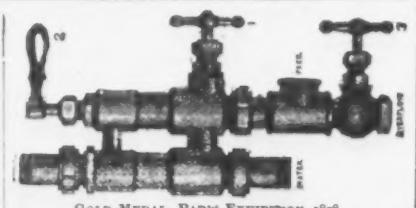
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PORTABLE DRILLS. Driven by power in any direction. RADIAL DRILLS. Self-feeding. Large Adjustable Box Table. VERTICAL DRILLS. Self-feeding. MULTIPLE DRILLS. 3 to 20 Spindles. HORIZONTAL BORING AND DRILLING MACHINES. HAND DRILLS. CAR BOX DRILLS. SPECIAL DRILLS. For Special Work.



PITTSBURGH MFG. CO.
Manufacturers of Nail and Spike Machines, Bolts, Nuts, Washers, Rivets, &c. Castings, Forgings and Blacksmith Work promptly attended to.

OFFICE & WORKS, Railroad St. near 28th, Pittsburgh, Pa.



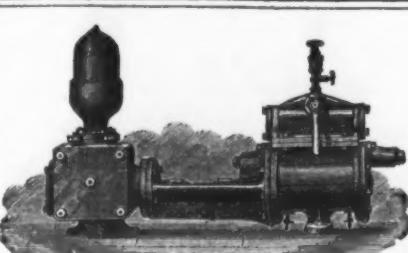
THE HANCOCK INSPIRATOR,
New Combined Pump and Injector.

Includes all other appliances hitherto introduced for feeding Steam Boilers. A Portable Boiler is not perfect without one. It lifts its water 25 feet with a low steam pressure, and puts it directly into the Boiler. No apparatus necessary for raising steam pressures.

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Manufactured by
Crane Bros.
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STEAM PUMPS



A. S. CAMERON'S

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"SPECIAL" STEAM PUMP

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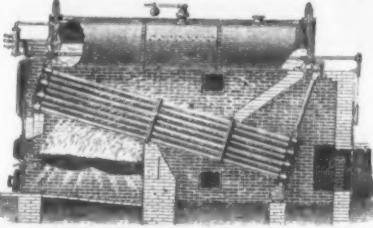
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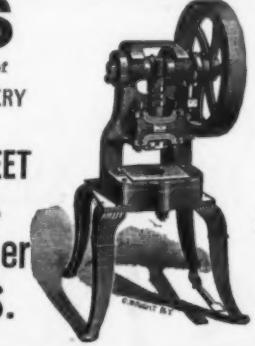
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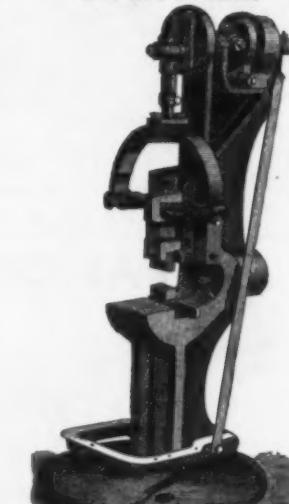
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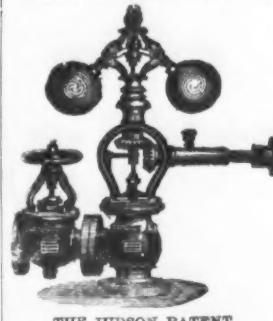
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No Charge for Box or Cartage.

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Reduced Price List, Nov. 1, 1870.

THE SHIVE STEAM ENGINE GOVERNOR.

Reduced Price List, Nov. 1, 1870.

Size of Governor	EXTRA FOR				
	Black	Fin- ished.	Ball and Lever.	Auto- matic Safety er.	Stop Valve.
3/4 in.	\$16.00	\$18.00	\$1.00	\$2.25	\$.....
1	18.00	20.00	2.00	2.35	\$.....
1 1/4	20.00	22.00	2.00	2.35	\$.....
1 1/2	23.00	25.00	2.00	2.75	\$6.00
2	27.00	31.00	2.00	2.75	7.50
2 1/2	38.00	37.00	3.50	3.25	9.00
3	36.00	41.00	3.50	3.50	11.00
3 1/2	49.00	46.00	4.00	3.75	12.00
4	45.00	52.00	4.00	4.00	17.00
4 1/2	54.00	61.00	4.00	4.50	17.00
5	61.00	73.00	5.00	5.00	21.00
5 1/2	74.00	84.00	5.00	5.50	25.00
6	84.00	95.00	6.00	6.00	31.00
6 1/2	97.00	109.00	6.50	6.50	37.00
7	112.00	125.00	7.00	7.00	42.00
7 1/2	138.00	146.00	8.00	8.00	50.00
8	160.00	176.00	9.00	9.00	56.00
8 1/2	180.00	198.00	10.00	10.00	55.00
9	200.00	220.00	12.00	12.00

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Improved Steam Governor.

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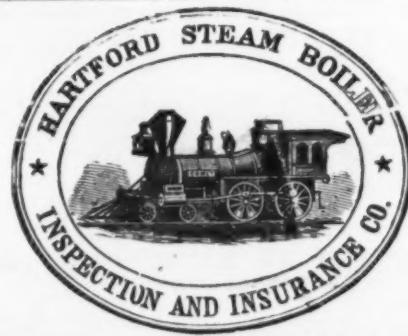
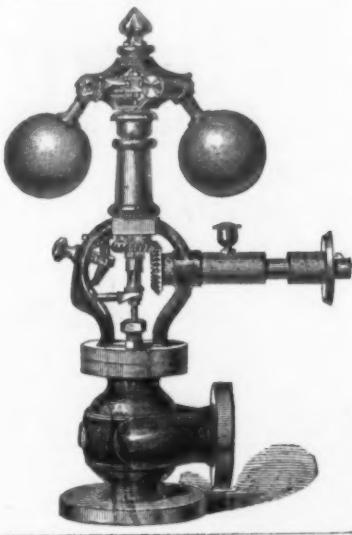
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1 1/2	23.00	25.00	2.00	2.75	\$6.00
2	27.00	31.00	2.75	2.75	9.00
2 1/2	30.00	41.00	3.50	3.50	12.00
3	45.00	52.00	4.25	4.25	17.00
3 1/2	54.00	62.00	4.50	4.50	21.00
4	64.00	73.00	5.00	5.00	25.00
4 1/2	74.00	84.00	5.50	5.50	31.00
5	92.00	95.00	6.00	17.00	37.00
5 1/2	112.00	121.00	7.00	7.50	40.00
6	120.00	146.00	8.00	8.50	50.00
6 1/2	152.00	176.00	9.00	10.00	60.00
7	160.00	176.00	10.00	12.00	75.00

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